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Climate and Marine Department
Japan Meteorological Agency

気象庁 気候・海洋気象部

平成１１年１１月

気象庁海洋月報は、気象庁 気候・海洋気象部 海洋課で作成しています。
本月報に関する問い合わせは、
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Monthly Ocean Report is prepared by the Oceanographical Division, Climate and Marine Department, Japan Meteorological Agency.

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表紙は、1999年11月の太平洋の月平均海面水温偏差図です。
陰影部は、平年より高温の海域を示しています。

The figure on the front cover shows the monthly mean SST anomalies for November 1999 in the Pacific Ocean.
Areas of positive anomalies are shaded.

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海況の特徴（１９９９年１１月）

日本近海の海況

海面水温は、ほぼ全域で平年より0.5℃以上高く、北日本及び東日本の周辺では1℃以上高かった（第４図）。

黒潮は、九州から紀伊半島にかけて接岸した後、東海沖で大きく南に蛇行していた。東海沖の蛇行の南端は先月に引続き南東に移動し、上旬は31.5°N、138.5°E付近、下旬には31°N、139.5°E付近に達していた。蛇行の北上部は、上旬は八丈島の西に、中・下旬は八丈島付近に位置していた。その後、黒潮は三宅島付近を流れた後、東北東に向きを変え、房総半島沖を流れていた（第9図）。

親潮系の冷水の沿岸寄りの分枝は39.5°N、143°Eまで、沖合の分枝は40.5°N、146.5°Eまで、それぞれ達していた（第5図）。

太平洋の海況

太平洋赤道域の海面水温は、日付変更線からペルー沖にかけて平年より1℃以上低く、エルニーニョ監視海域（4°N～4°S、150°W～90°W）の月平均海面水温偏差は－1.4℃であった。一方、150°E以西では＋0.5℃を超える正偏差となっていた。

北太平洋では、40°Nに沿った160°W以西で平年より1℃以上高かった。アラスカ湾の南では－1℃を超える負偏差が見られた（第16図）。

Highlights November 1999

Seas adjacent to Japan

SSTs were more than 0.5°C above normal around Japan, and anomalies exceeding +1°C prevailed in seas around Hokkaido and the eastern part of Honshu (Fig. 4).

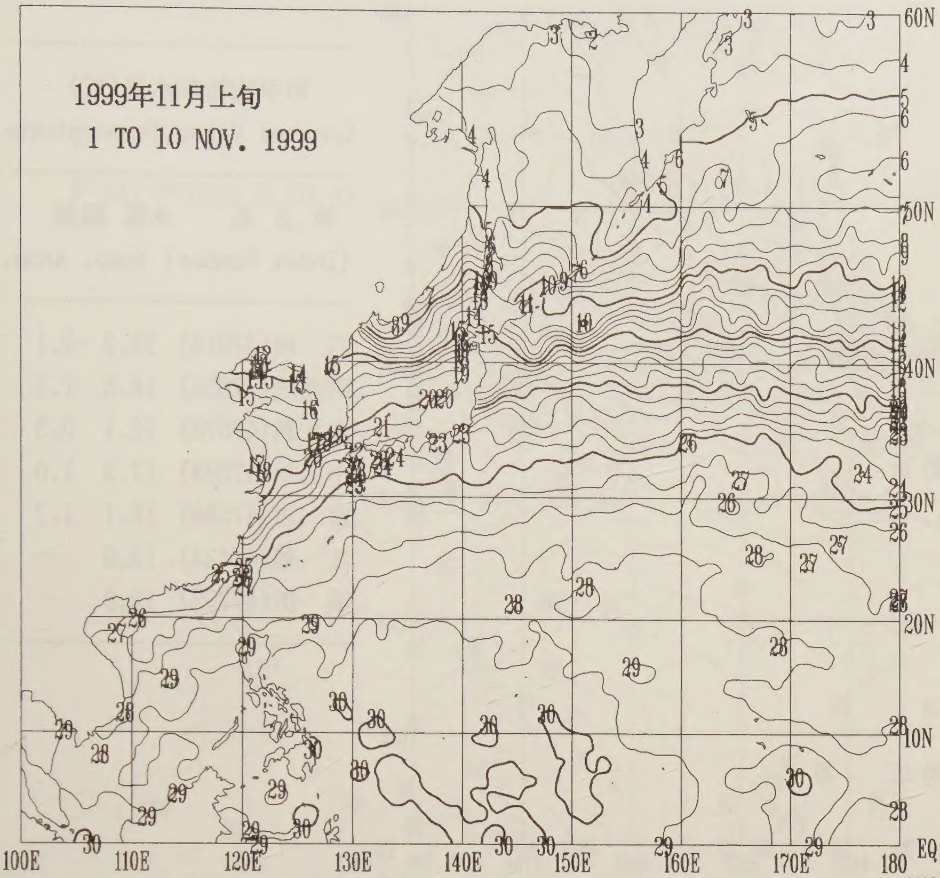
The Kuroshio flowed along the coasts from Kyushu to the Kii Peninsula, then largely meandered off Tokai. The southernmost position of the meander shifted SE-ward after the previous month to 31.5°N, 138.5°E in the first 10-day of the month and 31°N, 139.5°E in the last 10-day. The northward return flow of the meander was located west of Hachijo Island in the first 10-day and near Hachijo Island during the rest of the month. After passing near Miyake Island, it flowed ENE-ward off the Boso Peninsula (Fig. 9).

Coastal and off-coastal branches of the Oyashio cold water extended southward to 39.5°N, 143°E and 40.5°N, 146.5°E, respectively (Fig. 5).

Pacific Ocean

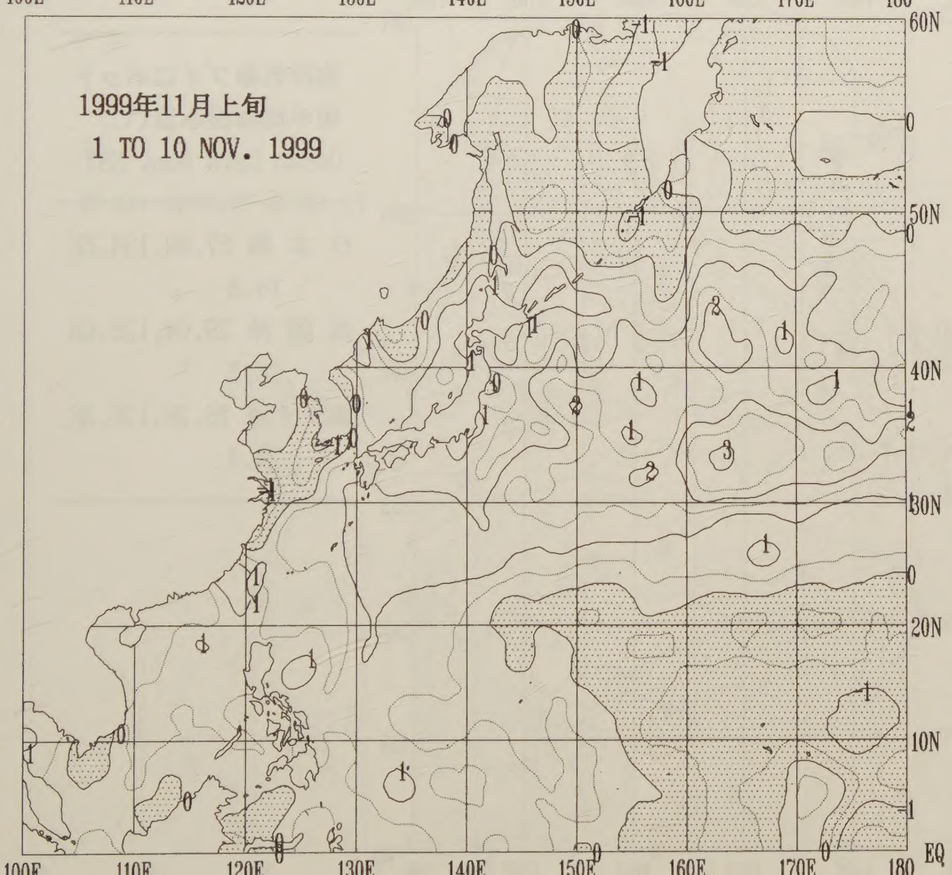
In the equatorial Pacific, negative SST anomalies exceeding -1°C prevailed from the date line to the coast of Peru. The monthly mean SST anomaly for the El Niño monitoring region (4°N-4°S, 150°W-90°W) was -1.4°C. SSTs were more than 0.5°C above normal west of 150°E.

In the North Pacific, positive SST anomalies exceeding +1°C prevailed from 160°W westward along 40°N. Negative SST anomalies exceeding -1°C were found south of the Gulf of Alaska (Fig. 16).



旬平均沿岸水温(℃)
Coastal Water Temperature

地 点 名 (Index Number)	水温 Temp.	偏差 Anom.
石　垣(47918)	25.1	0.1
御前崎(47655)	20.5	1.6
八丈島(47678)	22.6	-0.1
小名浜(47598)	17.9	0.4
宮　古(47585)	16.7	0.9
江　差(47428)	14.0	-
浜　田(47755)	20.1	-

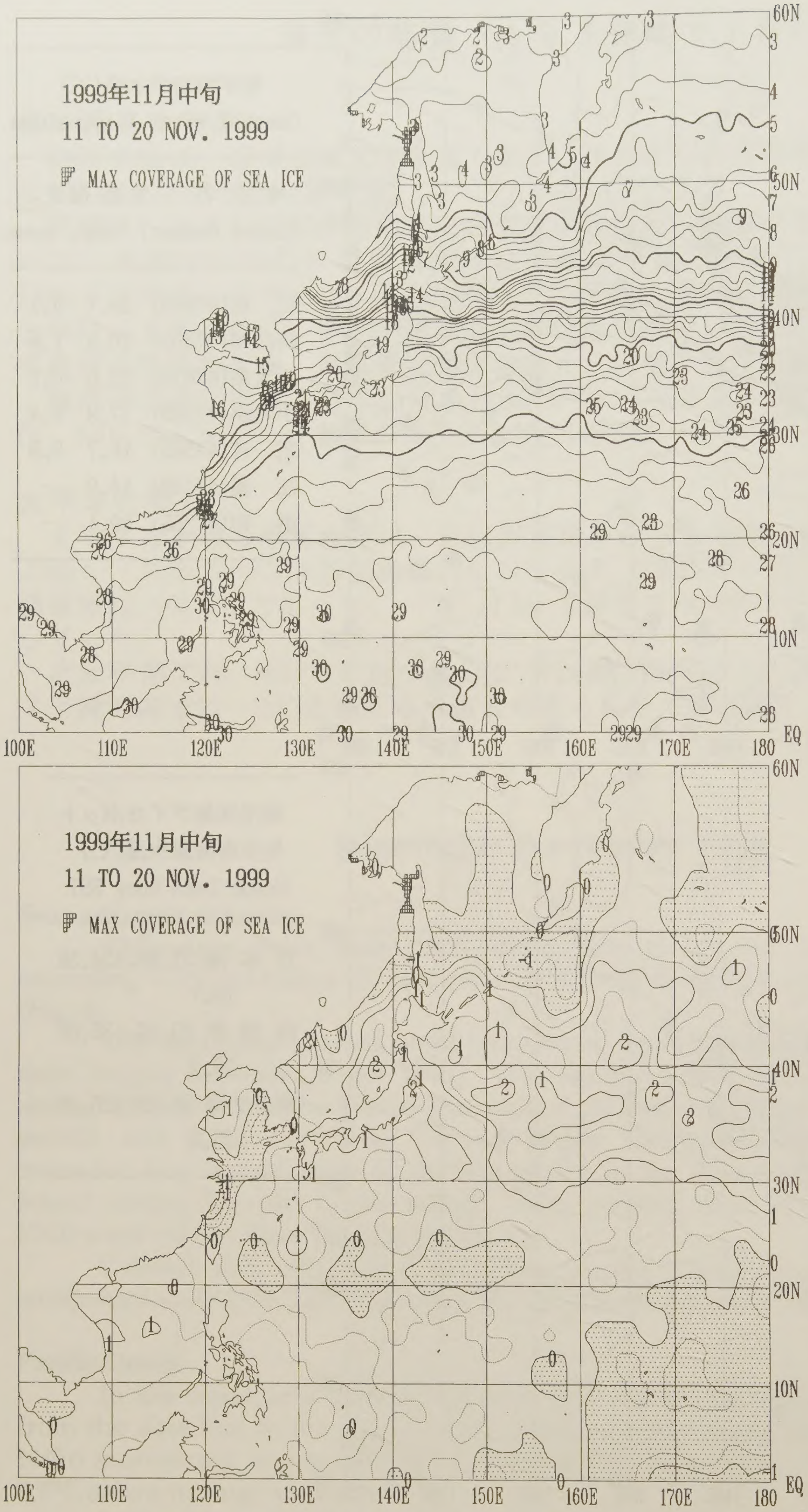


海洋気象ブイロボット
旬平均海面水温(℃)
Ocean Data Buoy SST

日 本 海	37.9N,134.5E	19.7
四 国 沖	29.0N,135.0E	26.2
東シナ海	28.2N,126.3E	25.4

第1図 北西太平洋旬平均海面水温図(上)及び偏差図(下)(1999年11月上旬)

Fig.1 Ten-day mean SST (top) and anomalies (bottom) in the western North Pacific for the 1st ten-day period in NOV 1999. Anomalies are computed from the JMA climatology (1961-90). Contour interval is 1°C and additional anomaly contours of 0.5°C are shown by broken lines. Negative anomalies are spotted.



旬平均沿岸水温(℃)
Coastal Water Temperature

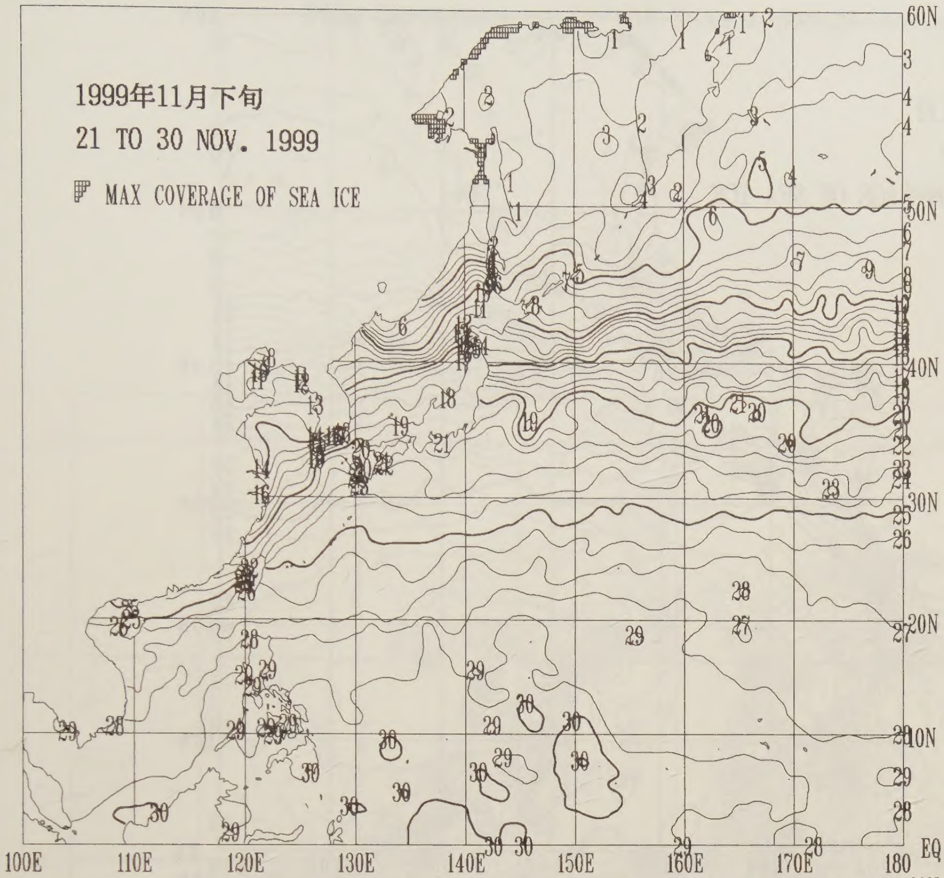
地点名 (Index Number)	水温 Temp.	偏差 Anom.
石　垣(47918)	24.2	-0.1
御前崎(47655)	18.5	1.2
八丈島(47678)	22.1	0.3
小名浜(47598)	17.2	1.0
宮　古(47585)	16.1	1.2
江　差(47428)	13.9	-
浜　田(47755)	19.3	-

海洋気象ブイロボット
旬平均海面水温(℃)
Ocean Data Buoy SST

日本海 37.9N,134.5E	18.8
四国沖 29.0N,135.0E	25.2
東シナ海 28.2N,126.3E	24.4

第2図 北西太平洋旬平均海面水温図(上)及び偏差図(下)(1999年11月中旬)

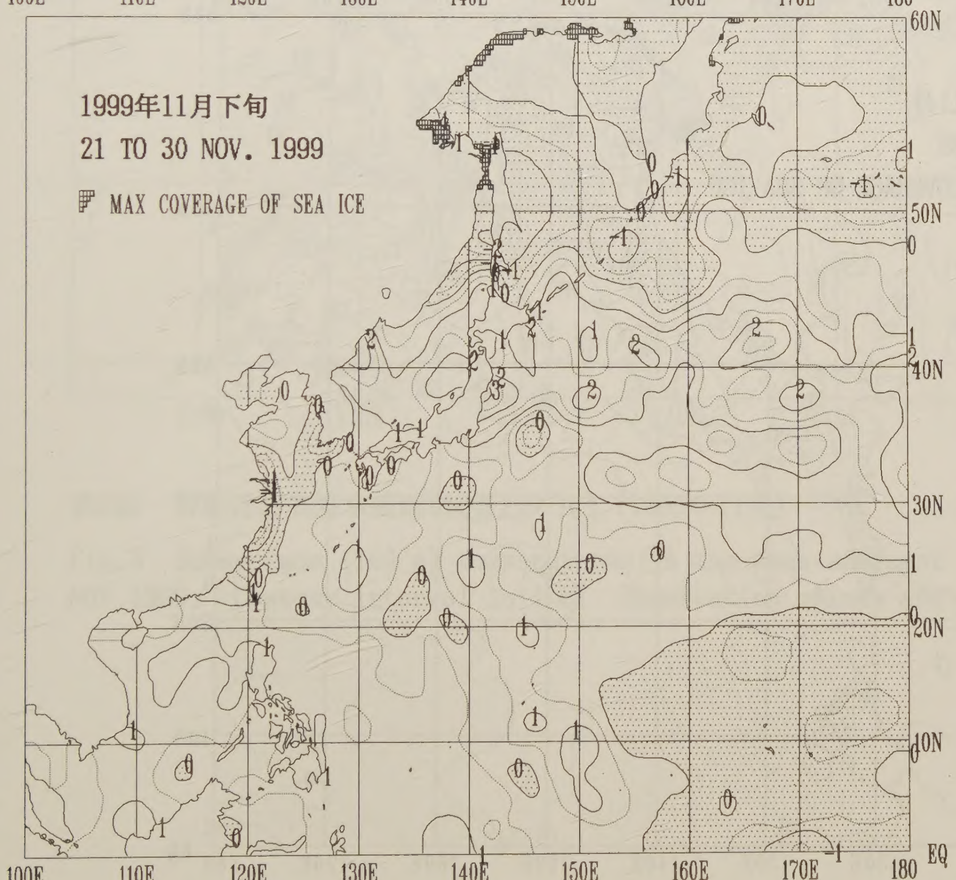
Fig.2 Ten-day mean SST (top) and anomalies (bottom) in the western North Pacific for the 2nd ten-day period in NOV 1999. Anomalies are computed from the JMA climatology (1961-90). Contour interval is 1°C and additional anomaly contours of 0.5°C are shown by broken lines. Negative anomalies are spotted.



旬平均沿岸水温(℃)

Coastal Water Temperature

地点名 (Index Number)	水温 Temp.	偏差 Anom.
石　垣(47918)	24.2	1.0
御前崎(47655)	17.1	1.2
八丈島(47678)	21.1	0.2
小名浜(47598)	17.8	2.8
宮　古(47585)	14.9	1.2
江　差(47428)	11.6	-
浜　田(47755)	17.5	-



海洋気象ブイロボット

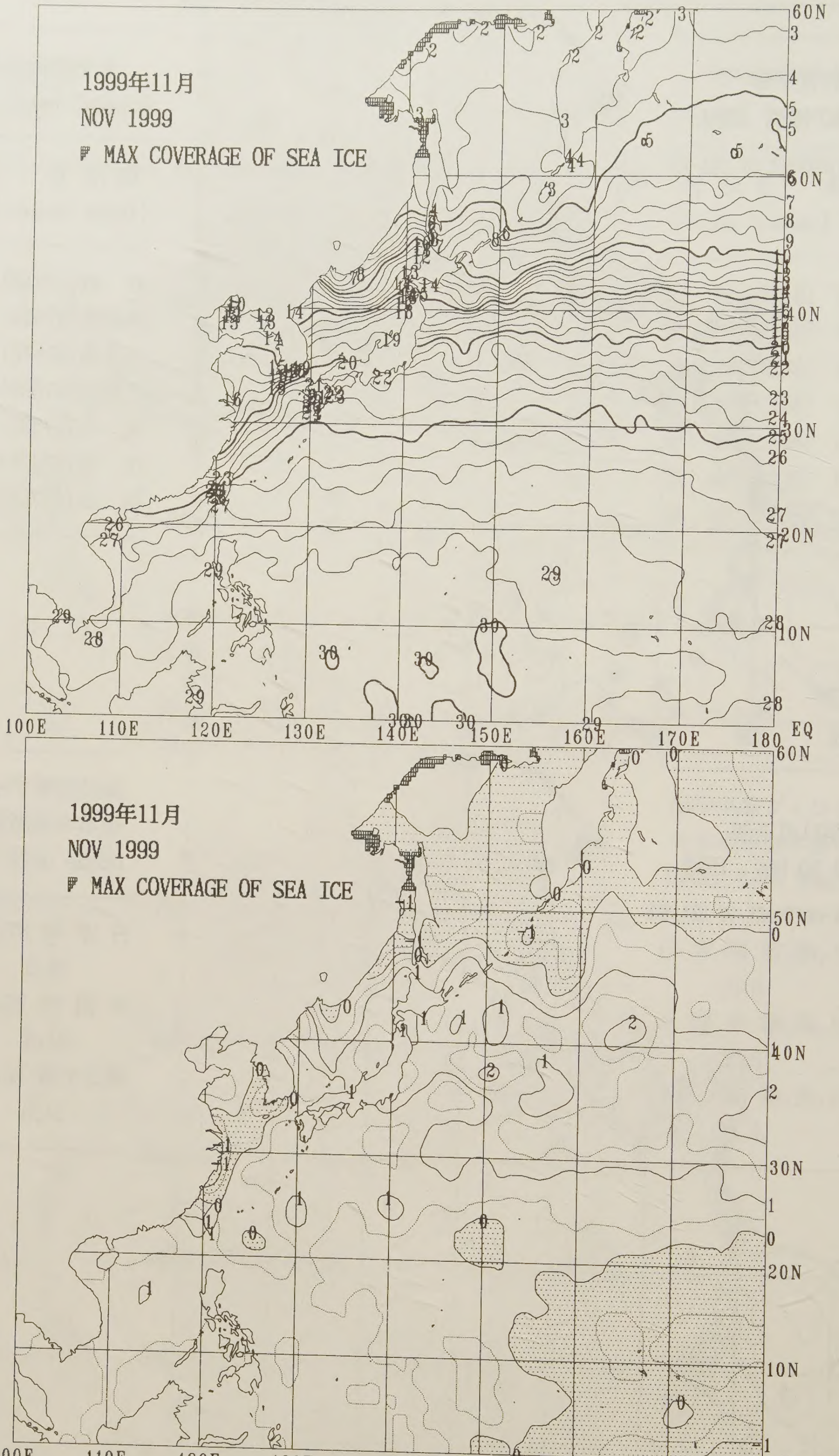
旬平均海面水温(℃)

Ocean Data Buoy SST

日本海	37.9N,134.5E 18.3
四国沖	29.0N,135.0E 24.4
東シナ海	28.2N,126.3E 24.5

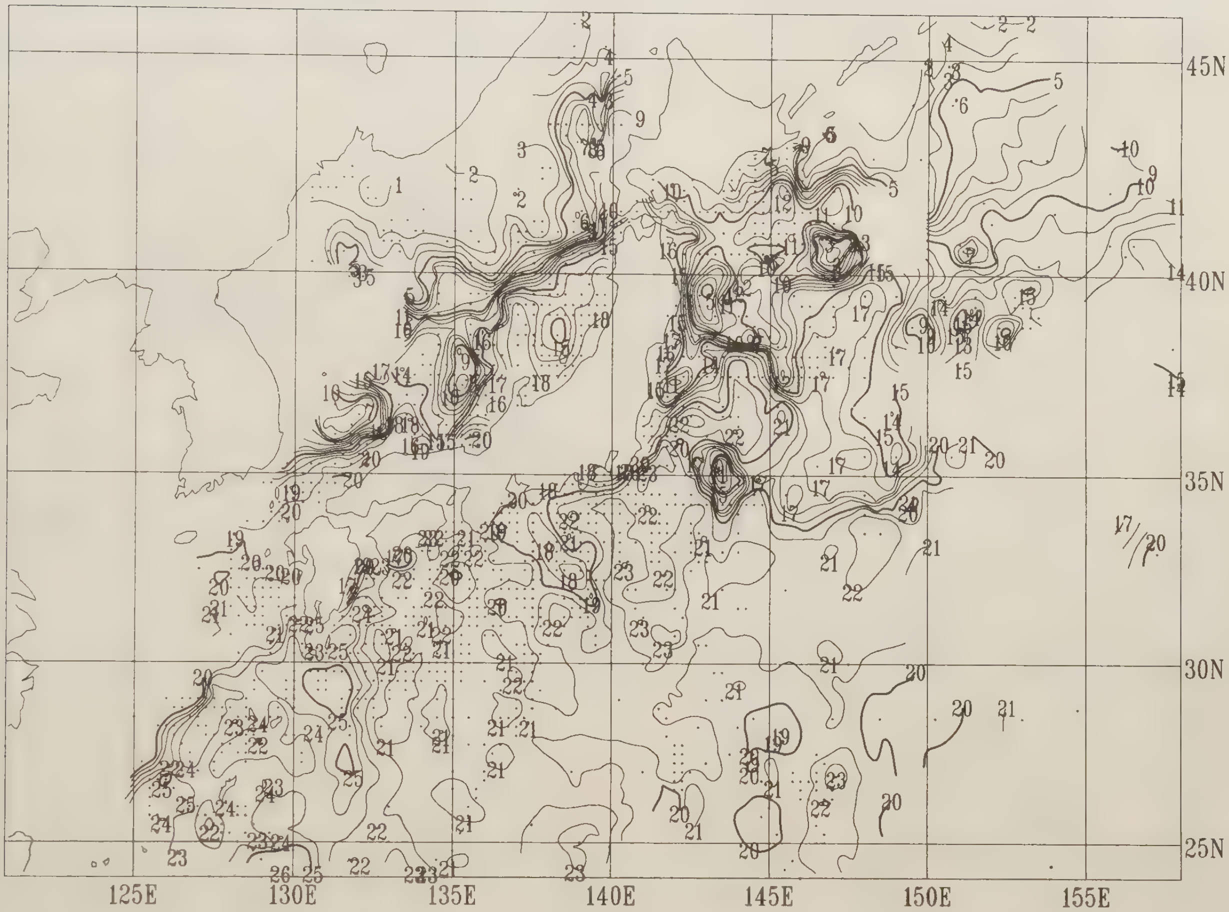
第3図 北西太平洋旬平均海面水温図(上)及び偏差図(下)(1999年11月下旬)

Fig.3 Ten-day mean SST (top) and anomalies (bottom) in the western North Pacific for the 3rd ten-day period in NOV 1999. Anomalies are computed from the JMA climatology (1961-90). Contour interval is 1°C and additional anomaly contours of 0.5°C are shown by broken lines. Negative anomalies are spotted.



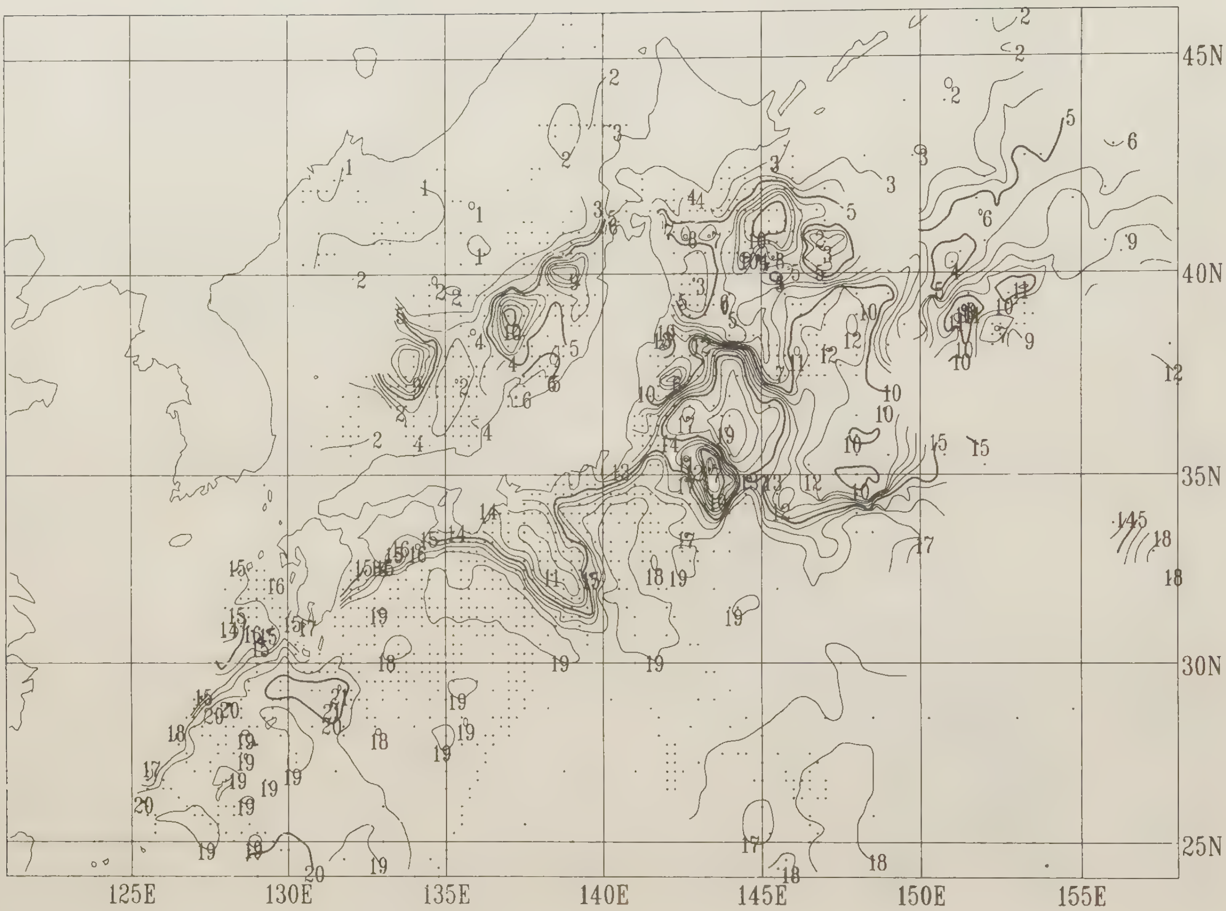
第4図 北西太平洋月平均海面水温図(上)及び偏差図(下)(1999年11月)

Fig.4 Monthly mean SST (top) and anomalies (bottom) in the western North Pacific for NOV 1999. Anomalies are computed from the JMA climatology (1961-1990). Contour interval is 1°C and additional anomaly contours of 0.5°C are shown by broken lines. Negative anomalies are spotted.



第5図　日本近海表層水温図(深さ100 m) (1999年11月)

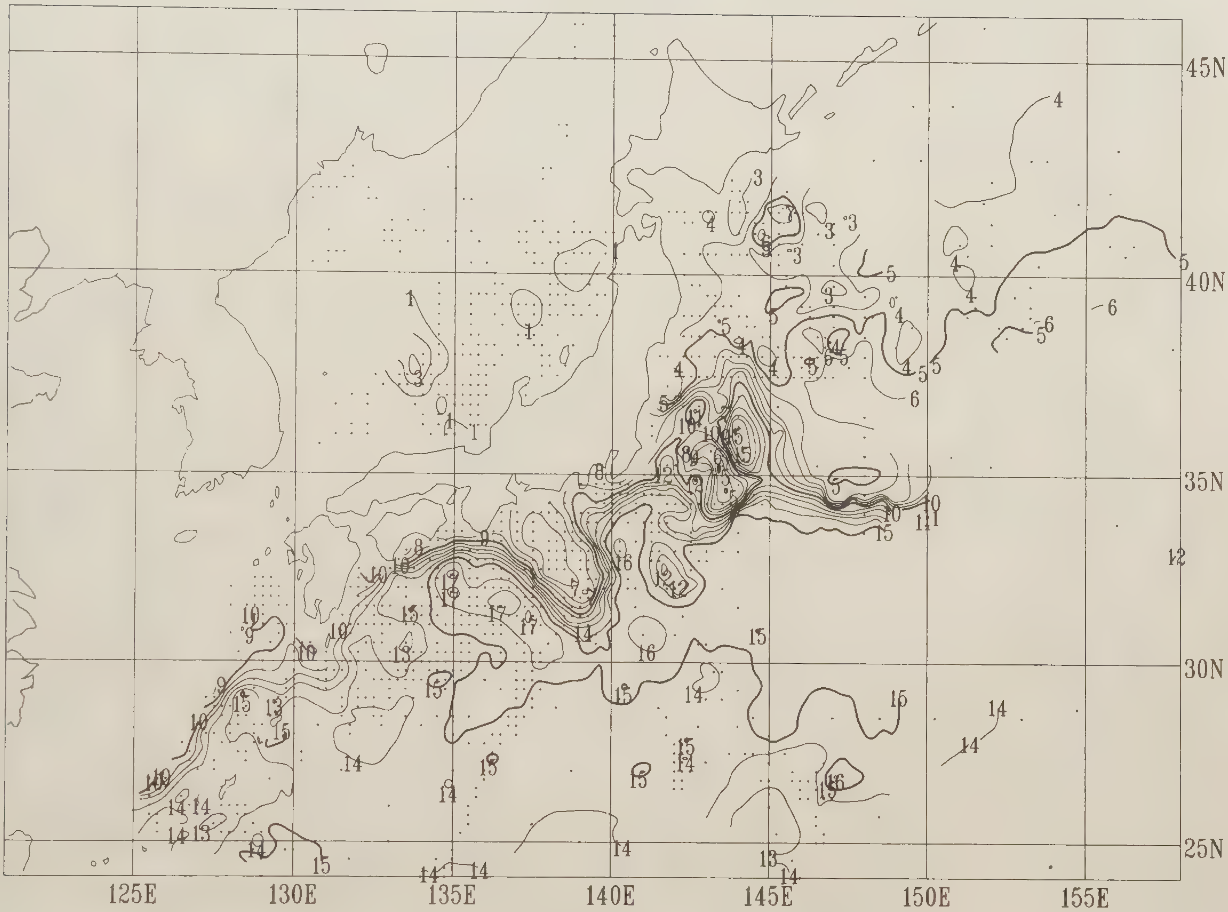
Fig.5 Subsurface (100 m) temperatures in the seas adjacent to Japan for NOV 1999. Contour interval is 1°C. Observation points are denoted by dots.



第6図　日本近海表層水温図(深さ200 m) (1999年11月)

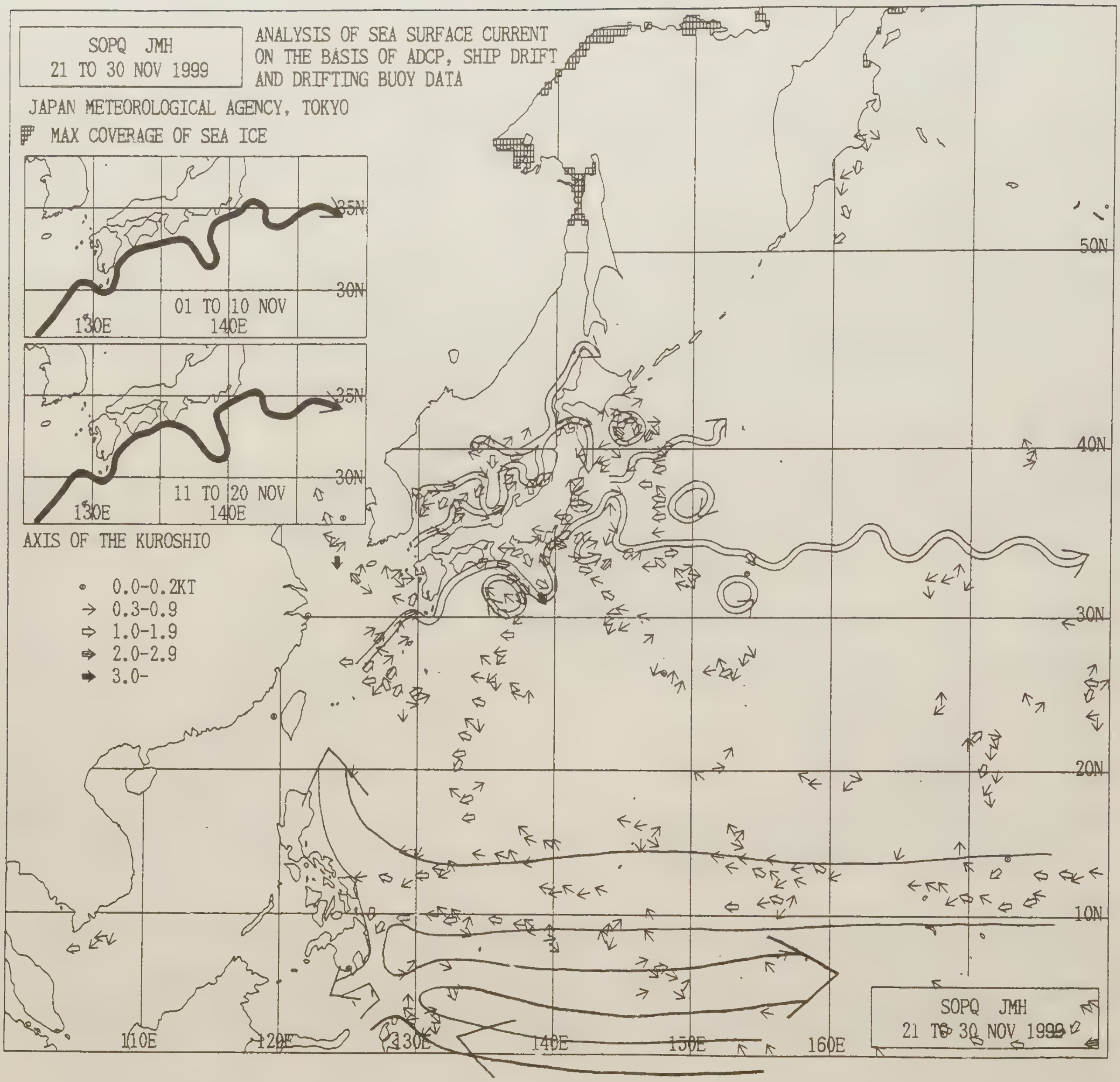
Fig.6 Subsurface (200 m) temperatures in the seas adjacent to Japan for NOV 1999. Contour interval is 1°C. Observation points are denoted by dots.

400m Temperatures in the Seas Adjacent to Japan



第7図　日本近海表層水温図(深さ400 m) (1999年11月)

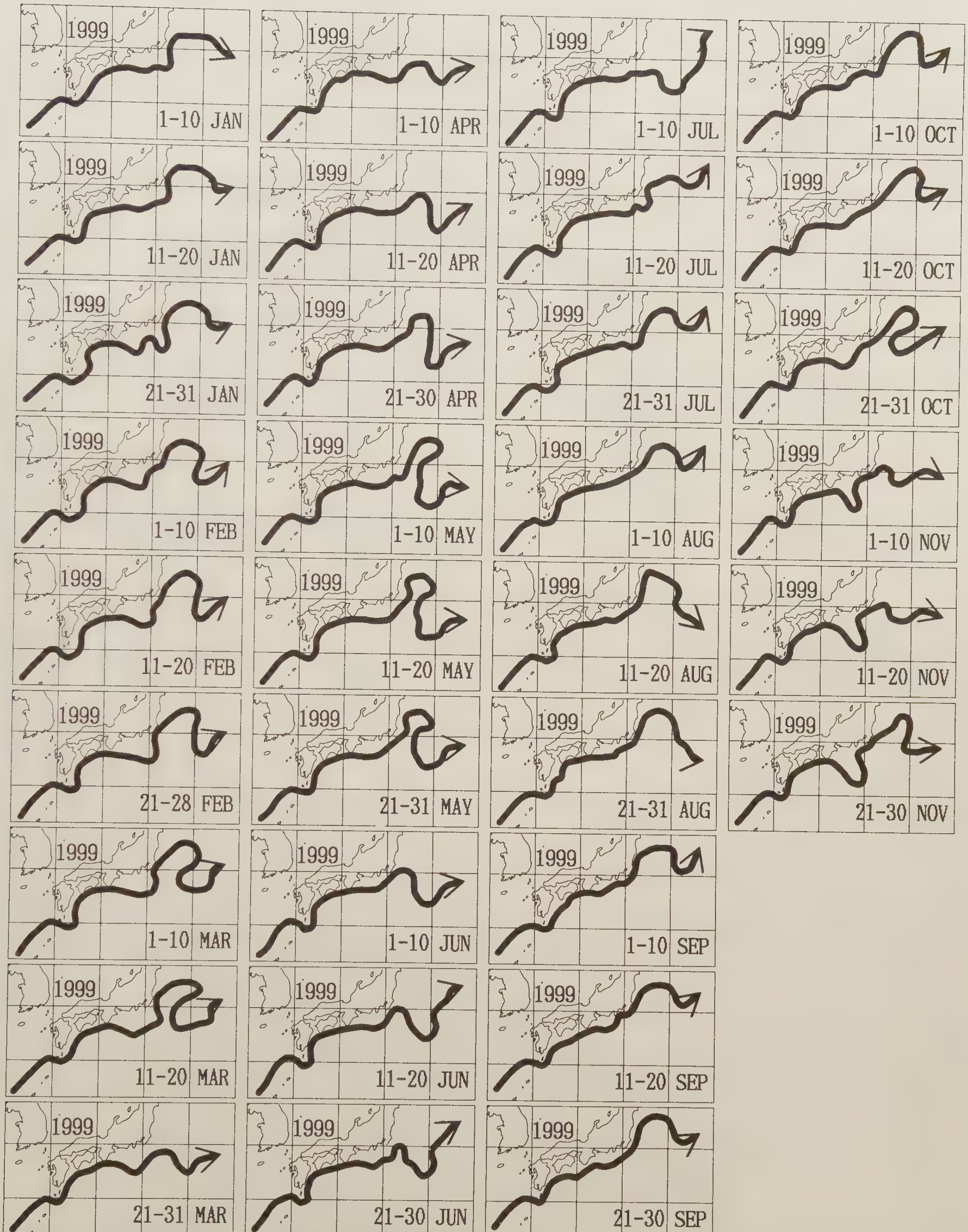
Fig.7 Subsurface (400 m) temperatures in the seas adjacent to Japan for NOV 1999. Contour interval is 1°C. Observation points are denoted by dots.



第8図　北西太平洋海流図（1999年11月下旬）

Fig. 8　Analysis of the sea surface current in the western North Pacific for the 3rd ten-day period in November 1999. Small arrows indicate *in situ* observations. Major currents such as the Kuroshio and the North Equatorial Current are denoted by larger open arrows.

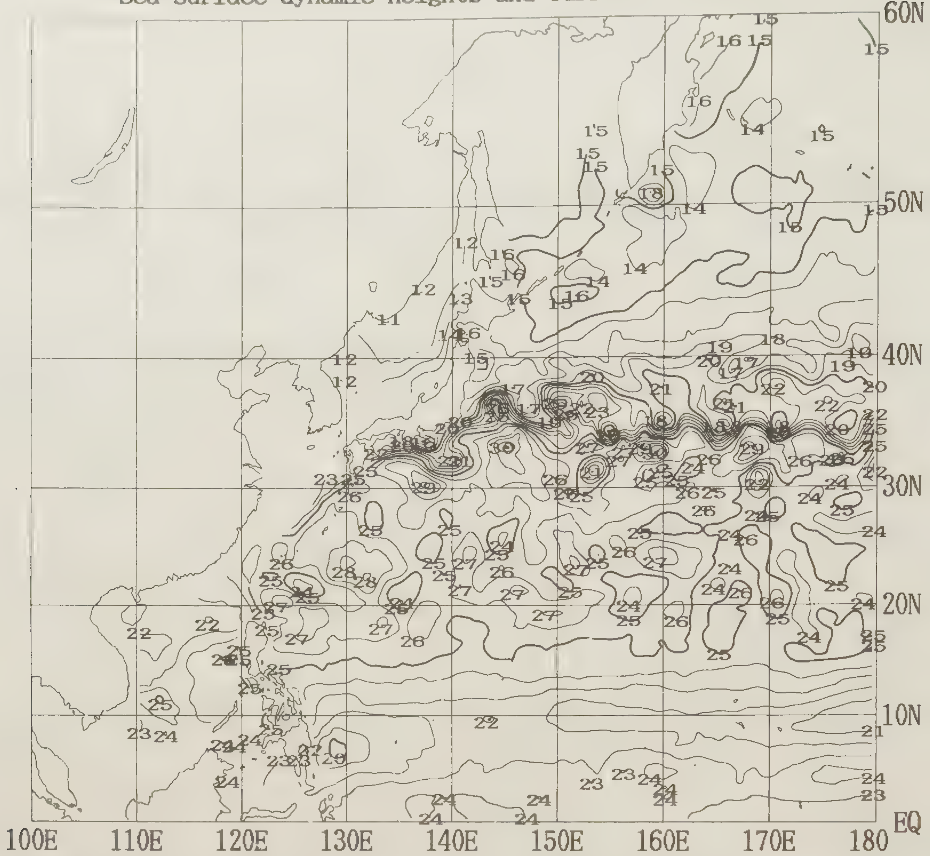
Location of the Kuroshio axis



第9図 旬別黒潮流軸図

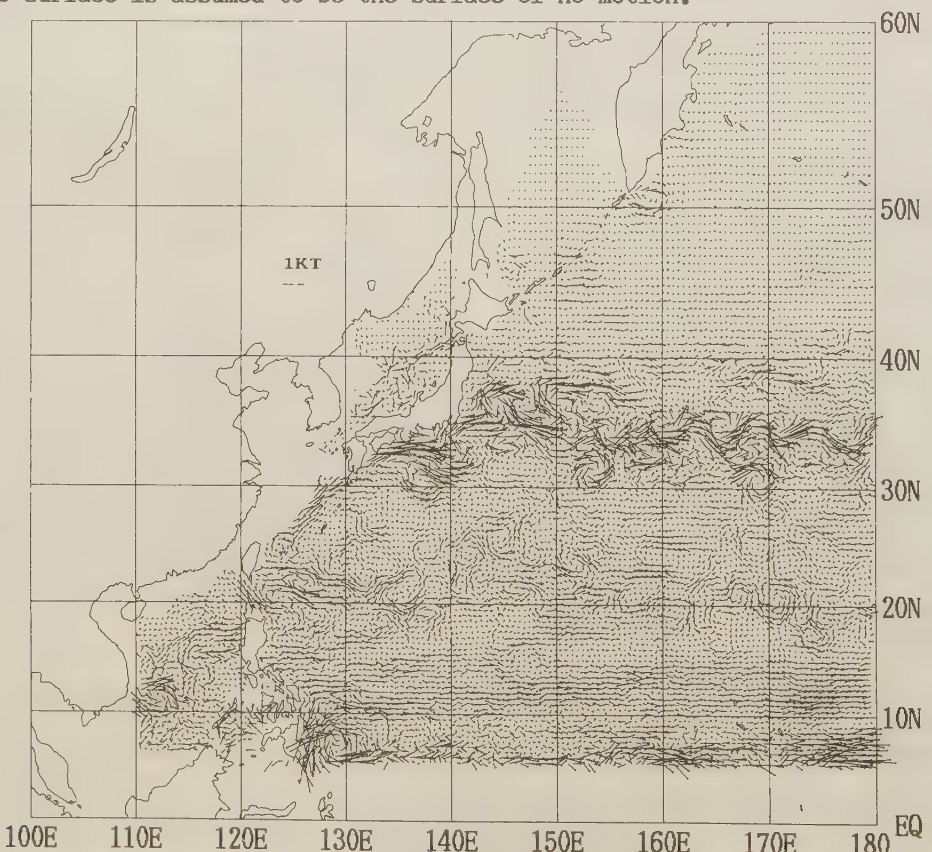
Fig.9 Location of the Kuroshio axis

Sea surface dynamic heights and current distribution



第10図 北西太平洋力学的海面高度分布図(1999年11月16日)

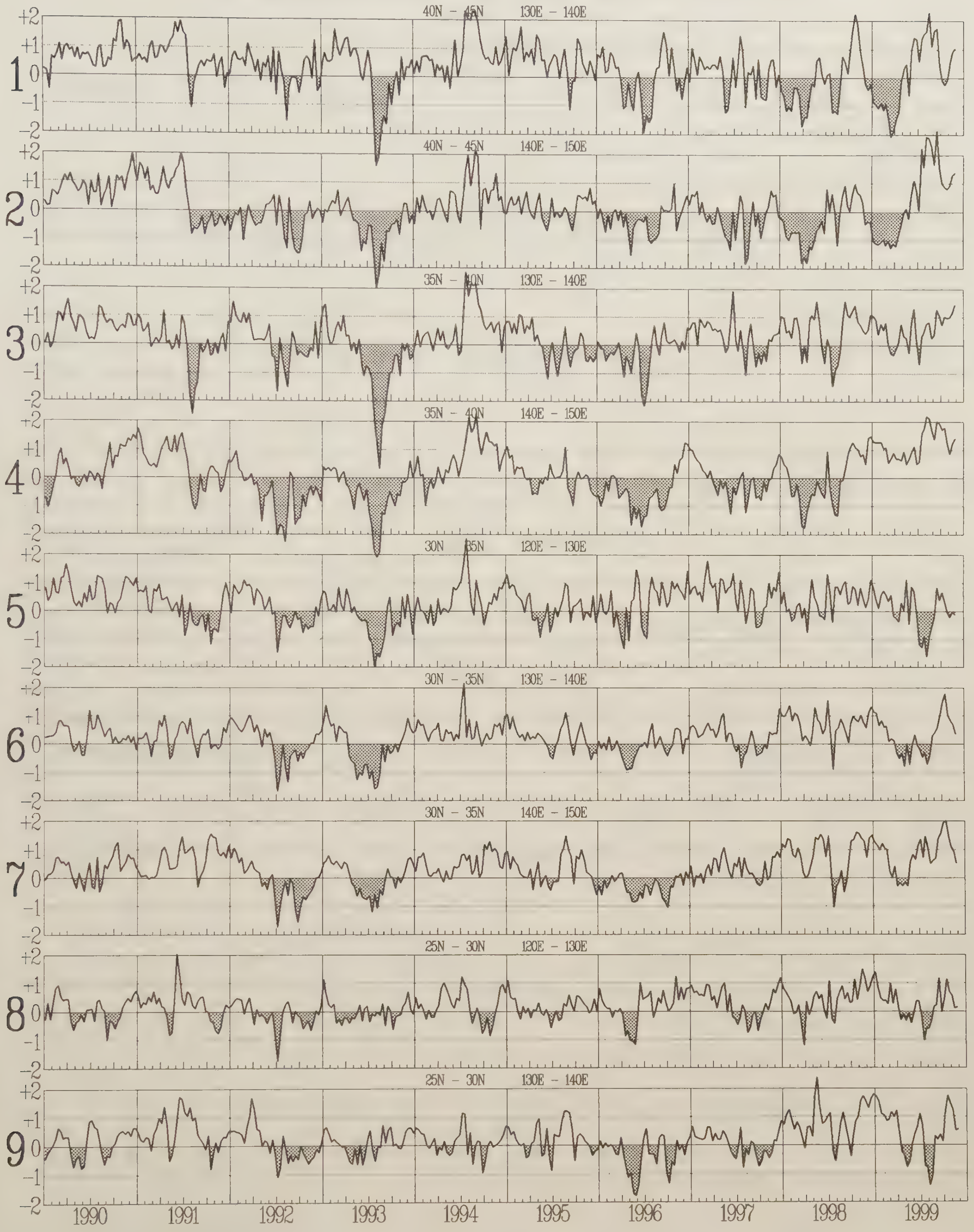
Fig.10 Sea surface dynamic heights (10cm) in the western North Pacific derived from the altimeter data of TOPEX/POSEIDON (NOV 16, 1999).
1500db surface is assumed to be the surface of no motion.

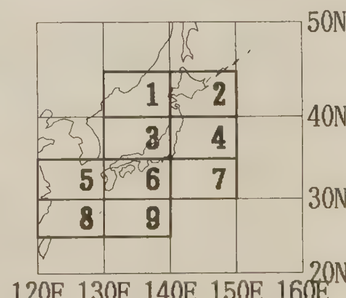


第11図 北西太平洋海流ベクトル図(1999年11月16日)

Fig.11 Sea surface current vectors in the western North Pacific (NOV 16, 1999).
Vectors are derived from the sea surface dynamic heights from TOPEX/POSEIDON and subsurface temperature distribution assuming the geostrophic relation.

Time Series of Area Mean SST in the Western North Pacific

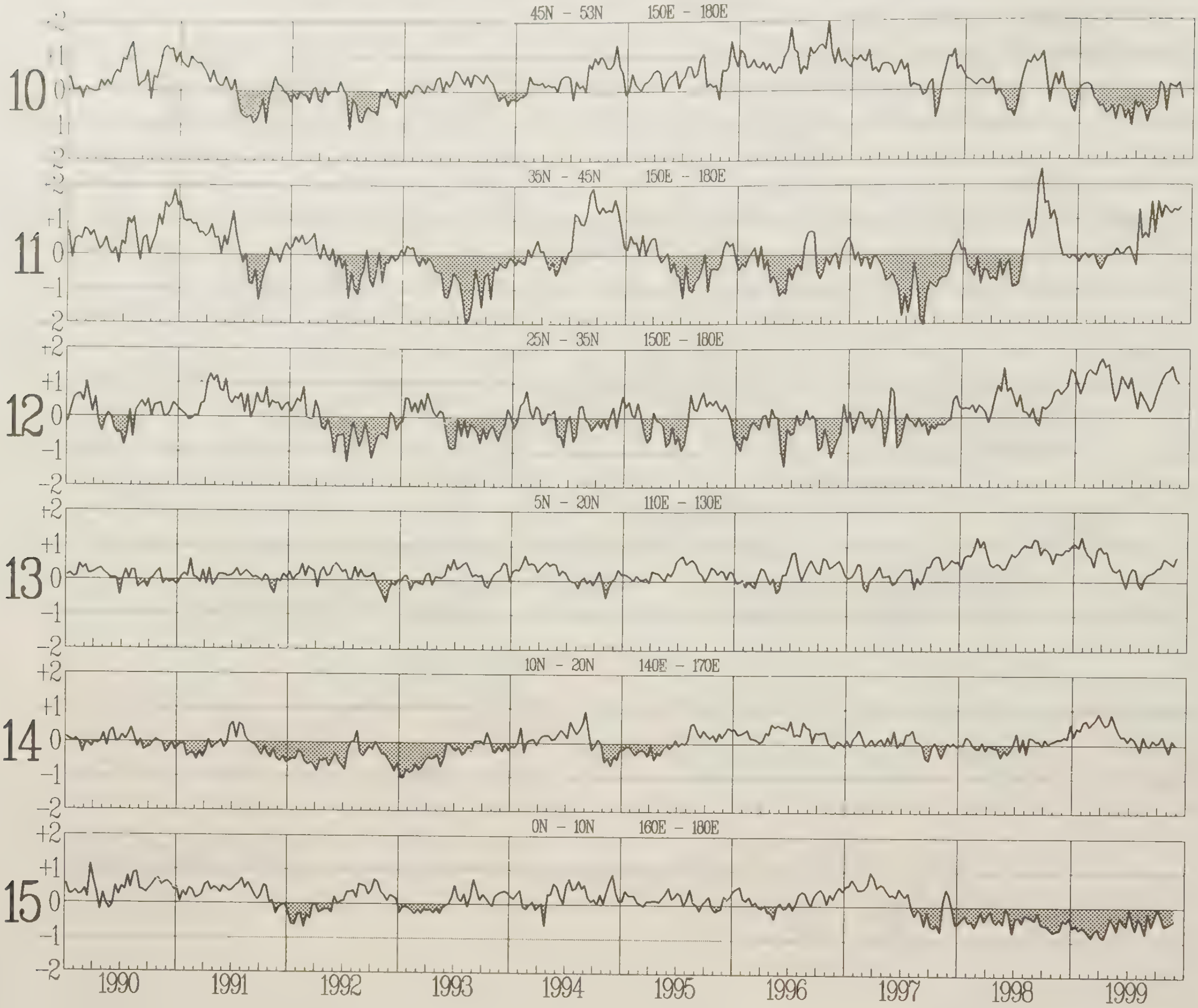




第12図　海域別旬平均海面水温平年偏差時系列図

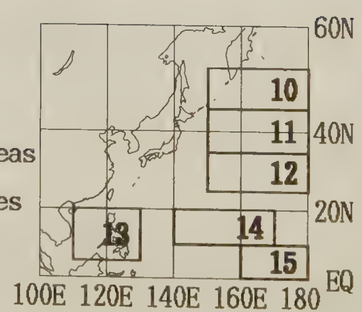
Fig.12 Time series of the ten-day mean sea surface temperature anomalies (°C) in the western North Pacific for the areas shown in the right panel. Negative anomalies are shaded. Anomalies are computed from the JMA climatology (1961-90).

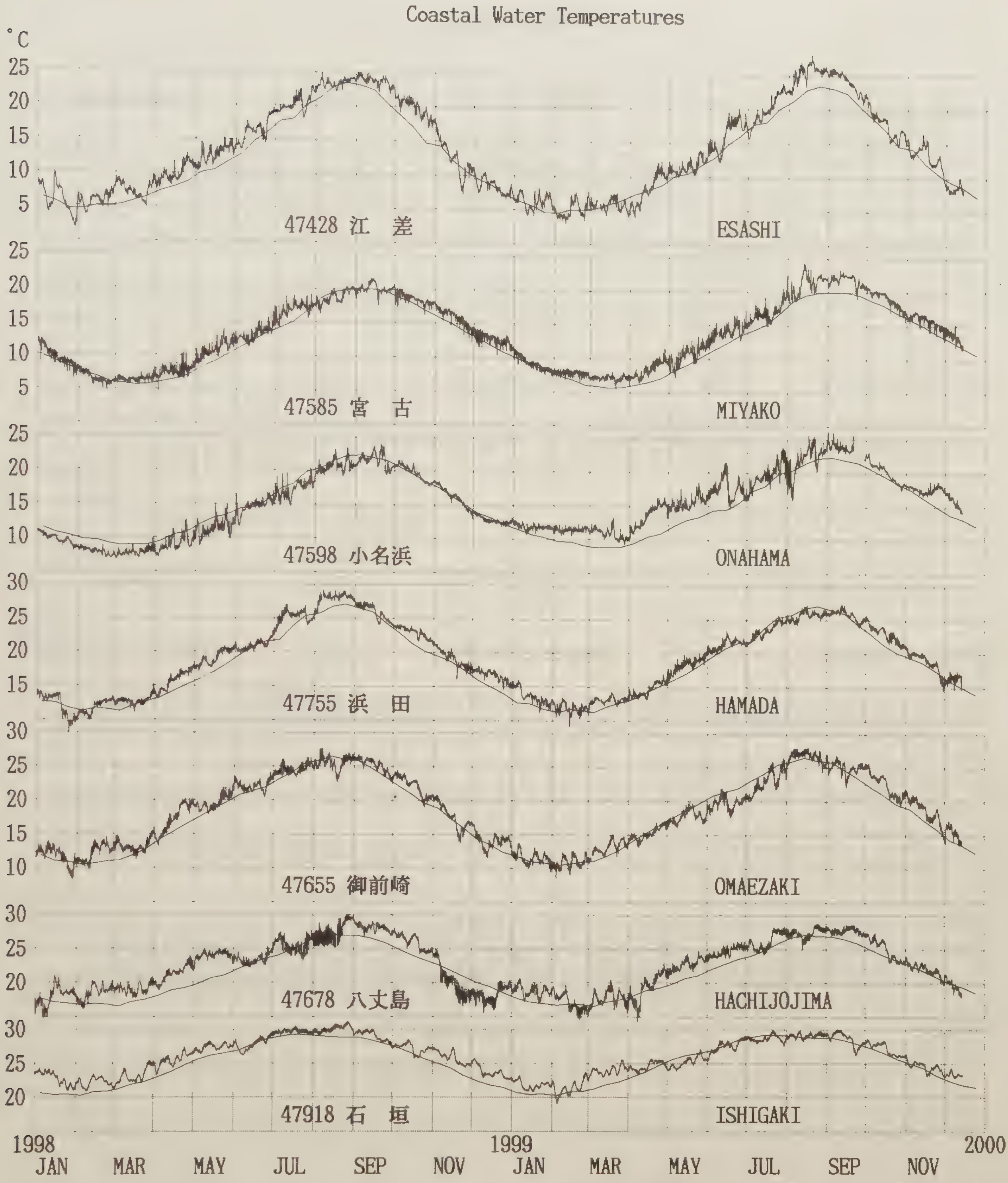
Time Series of Area Mean SST in the Western North Pacific

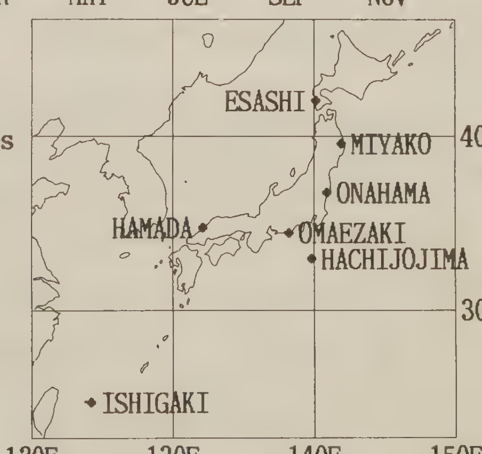


第12図　海域別旬平均海面水温平年偏差時系列図（つづき）

Fig.12 (continue) Time series of the ten-day mean sea surface temperature anomalies (°C) in the western North Pacific for the areas shown in the right panel. Negative anomalies are shaded. Anomalies are computed from the JMA climatology (1961-90).

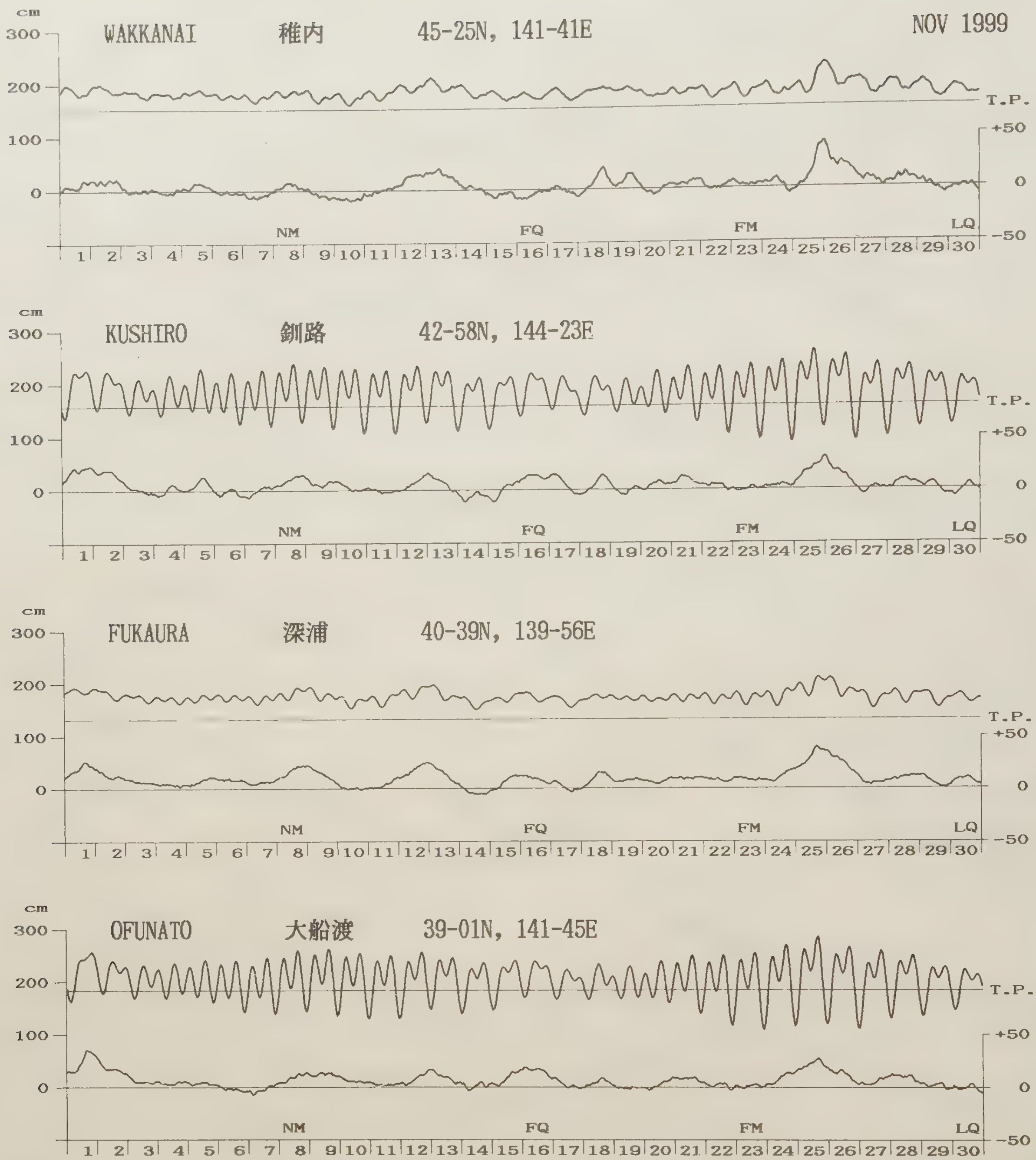






第13図 沿岸水温時系列図

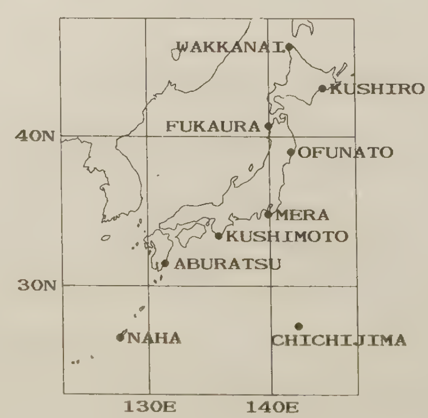
Fig.13 Time series of hourly coastal water temperatures (°C) measured at 7 coastal stations of the JMA shown in the right panel.
Thin lines show ten-day mean climatology.



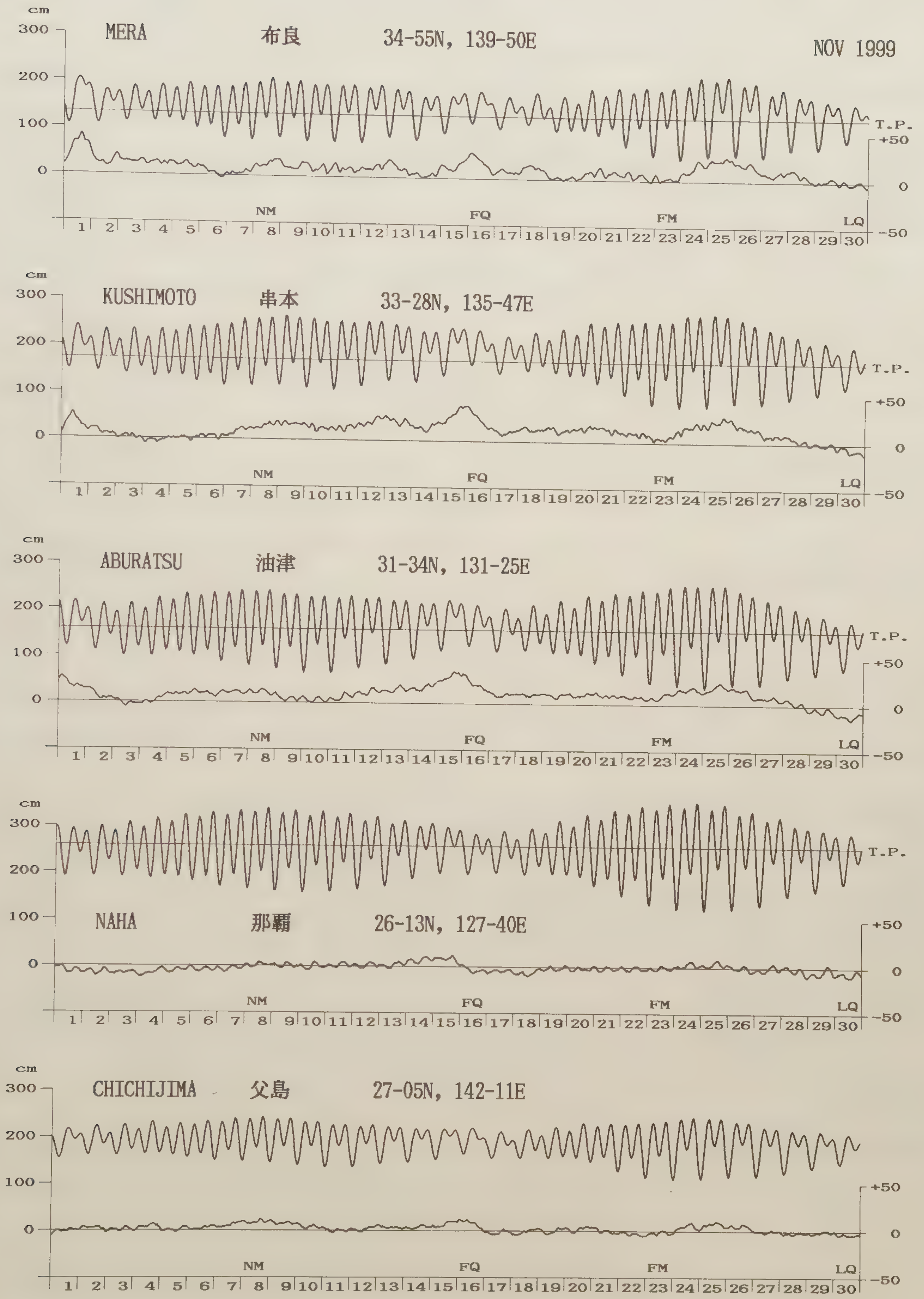
第14図 沿岸潮位時系列図（1999年11月）

Fig.14 Time series of hourly sea level observation (upper line) and its anomalies (lower line) at 9 stations of the JMA in the right panel.
Short term variations are removed from raw data.

NM: new moon, FQ: first quarter
FM: full moon, LQ: last quarter
T.P.: Mean sea level of Tokyo Bay (Tokyo Peil)



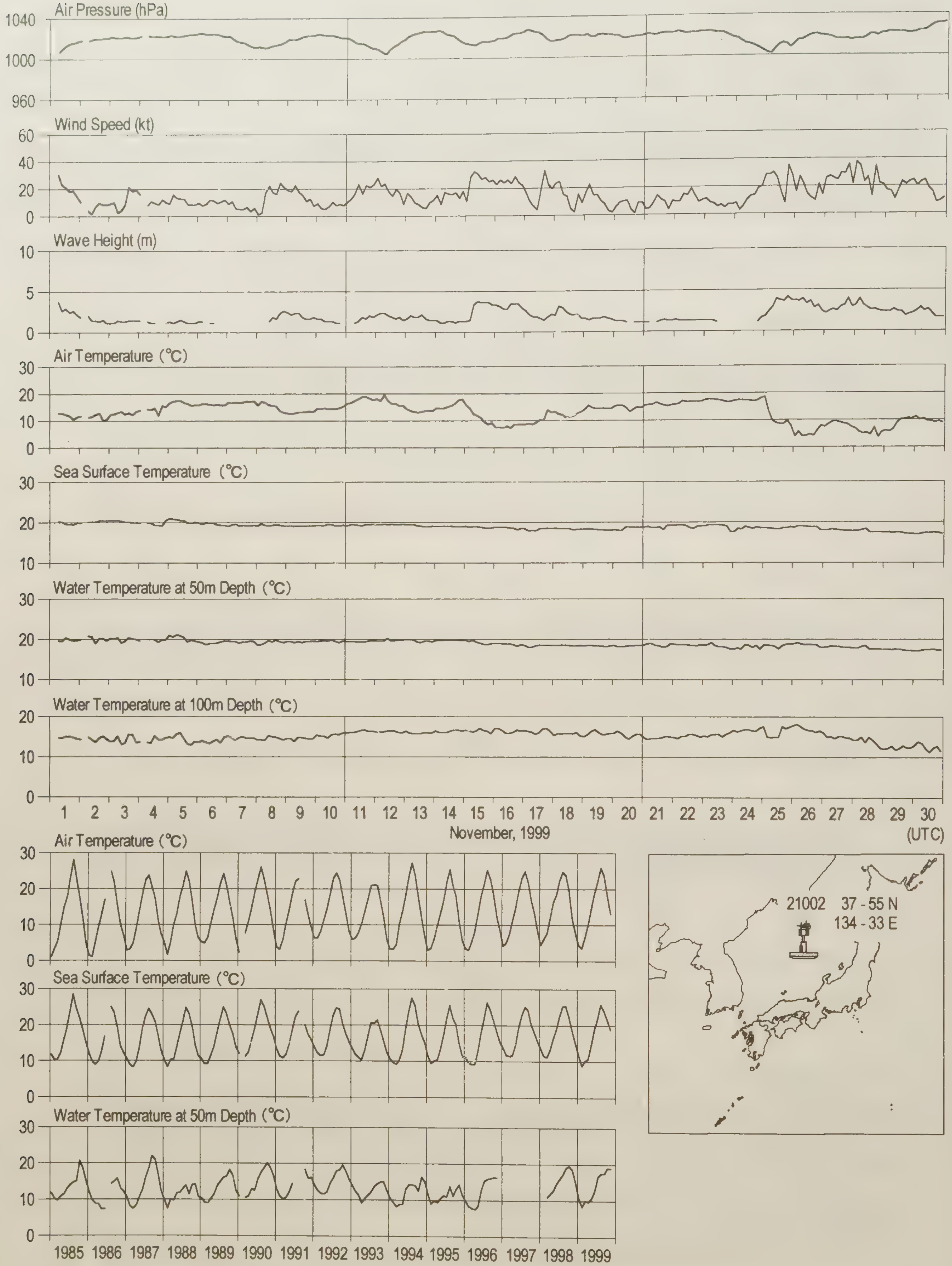
Time series of Sea Level



第14図 つづき

Fig.14 continue

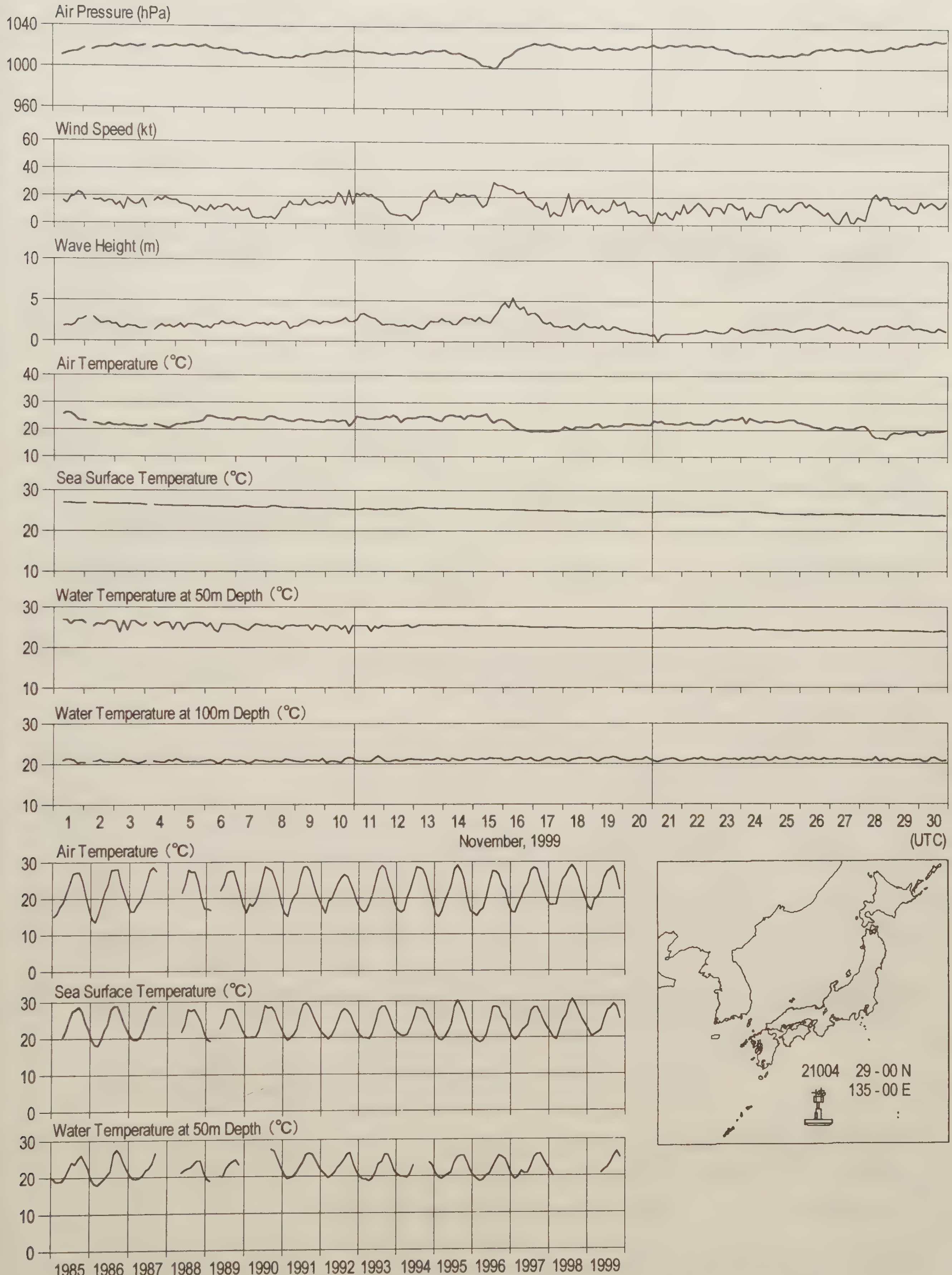
Ocean Data Buoy Observations



第15図　海洋気象ブイロボットによる観測要素の時系列図（日本海：21002）
上段は3時間毎の観測値を、下段は月平均値を示す。

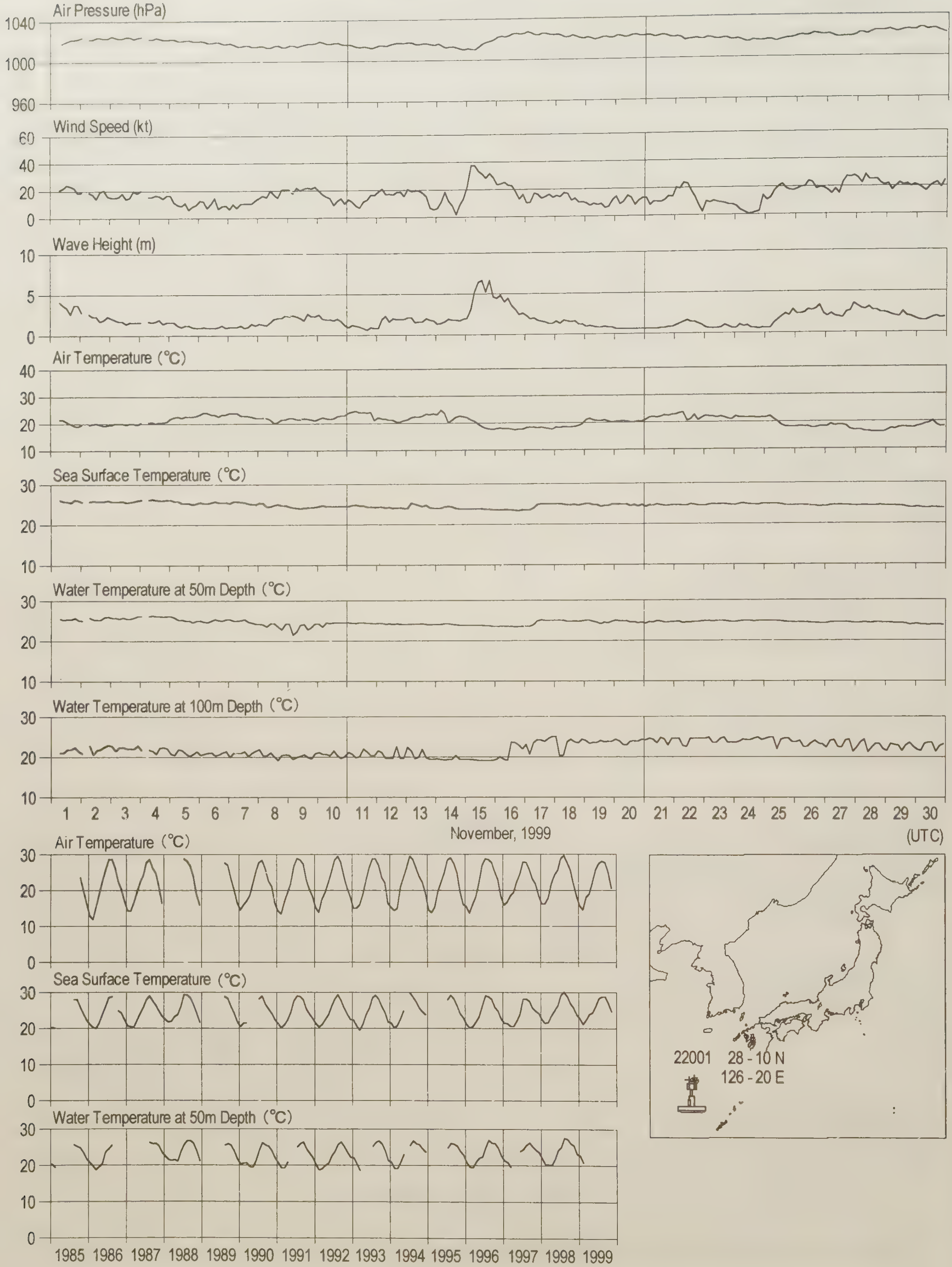
Fig.15　Time series of JMA buoy observation in the Japan Sea (WMO ID No. 21002).
The upper panel shows three hourly observation and the lower panel shows the monthly mean data.

Ocean Data Buoy Observations



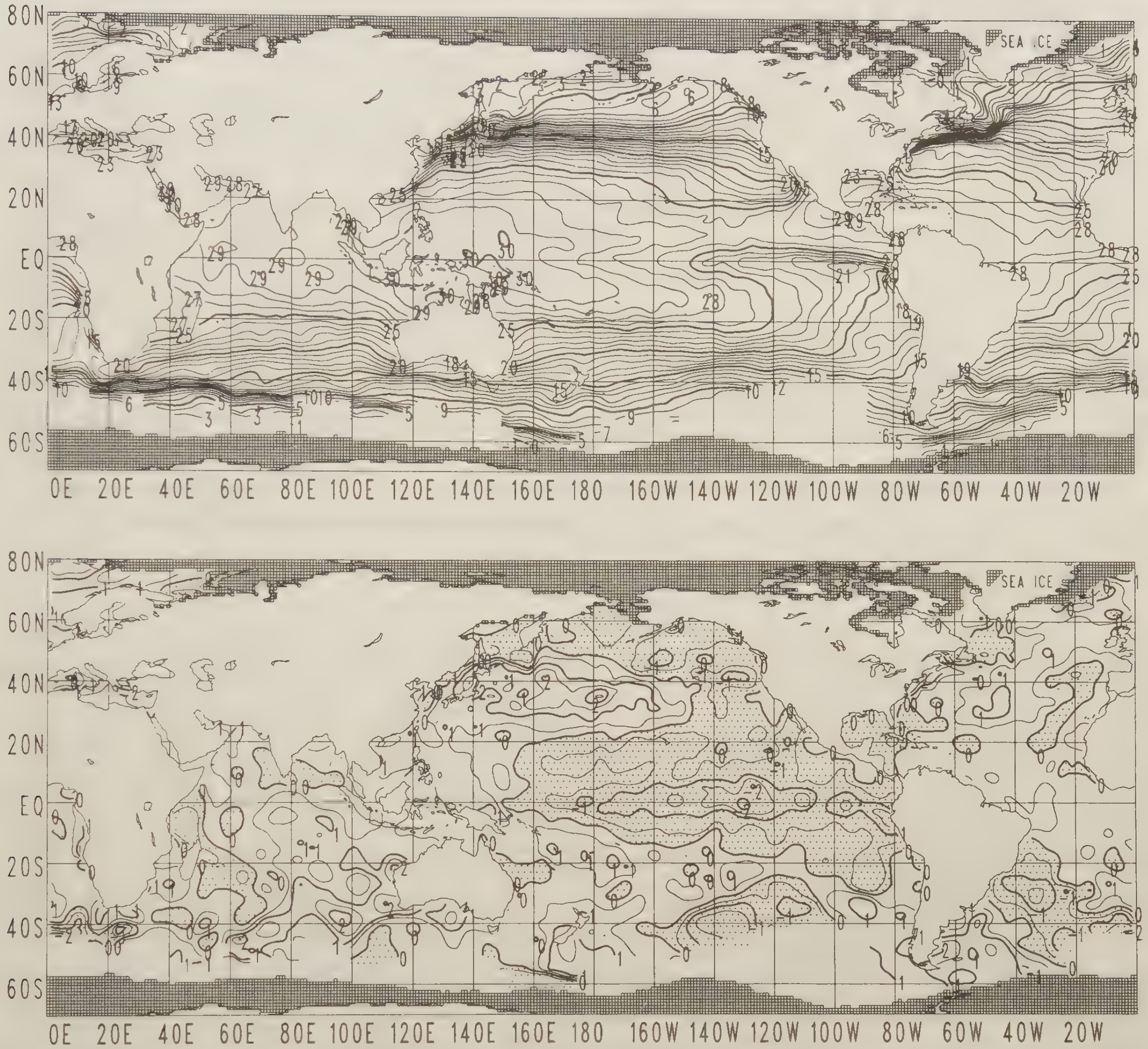
第15図　海洋気象ブイロボットによる観測要素の時系列図（四国沖：21004）
上段は３時間毎の観測値を、下段は月平均値を示す。

Fig.15　Time series of JMA buoy observation south of Shikoku (WMO ID No. 21004).
The upper panel shows three hourly observation and the lower panel shows the monthly mean data.



第15図　海洋気象ブイロボットによる観測要素の時系列図（東シナ海：22001）
上段は３時間毎の観測値を、下段は月平均値を示す。

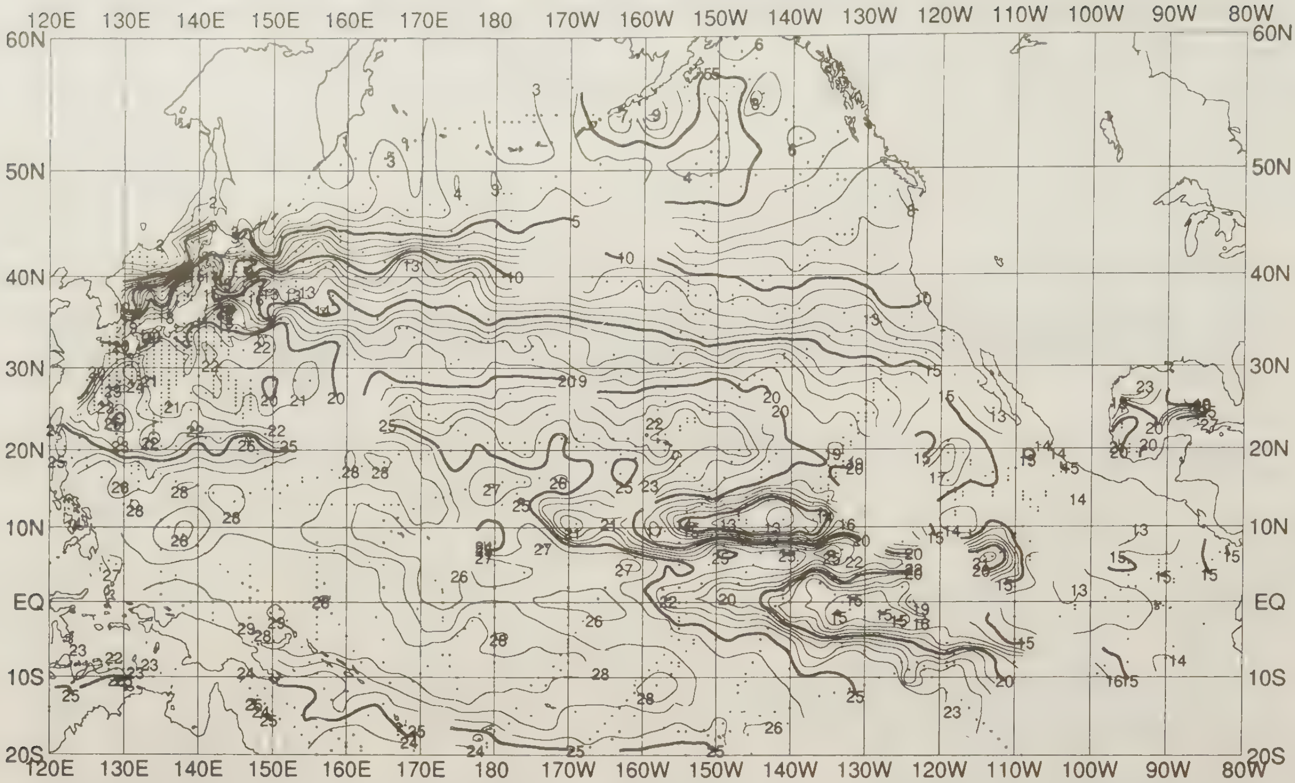
Fig.15　Time series of JMA buoy observation in the East China Sea (WMO ID No. 22001).
The upper panel shows three hourly observation and the lower panel shows the monthly mean data.



第16図　全球月平均海面水温図（上）及び偏差図（下）（1999年11月）

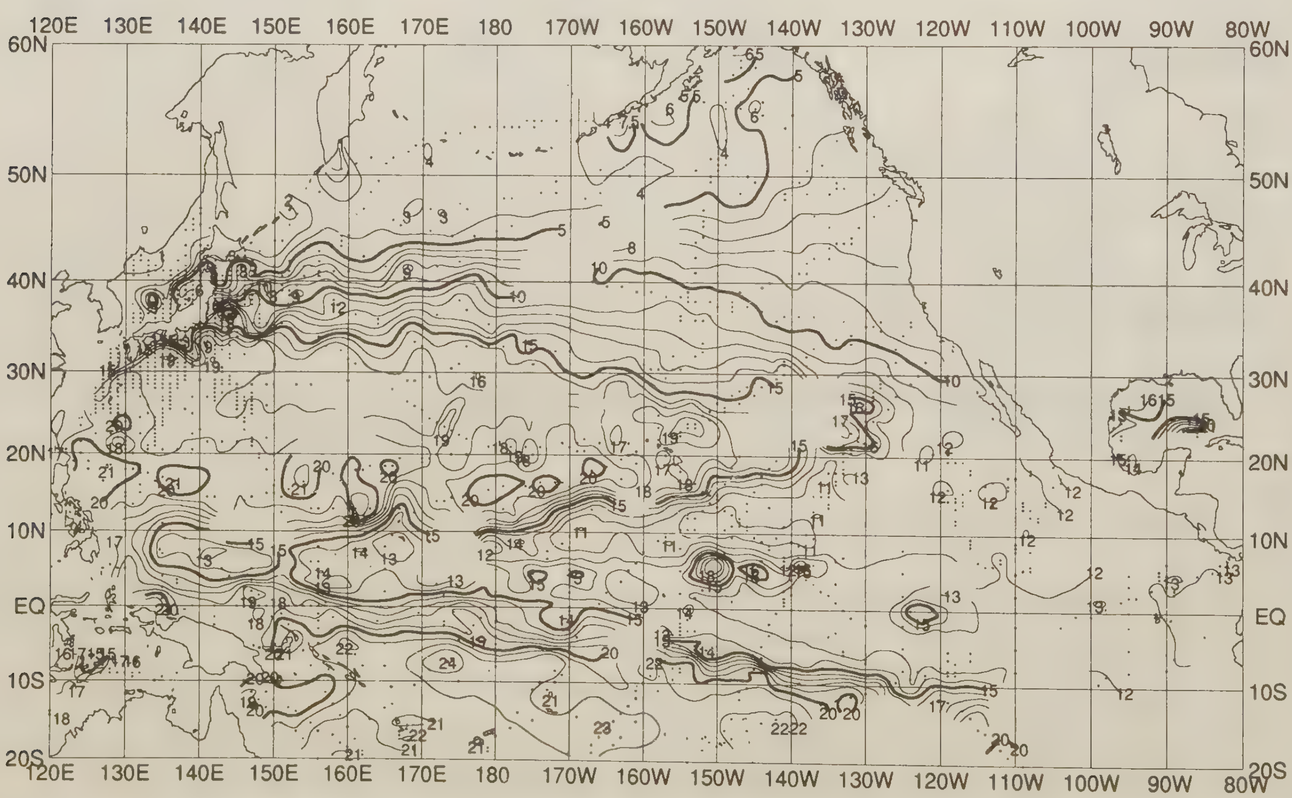
Fig.16 Monthly mean sea surface temperature over the global ocean (top) and anomalies (bottom) for NOV 1999. Anomalies are computed from the JMA climatology (1961-1990). Contour interval is 1°C (top) and additional anomaly contours of ±0.5°C are shown by thin lines. Negative anomalies are spotted. Maximum coverage of sea ice is shaded. Data sources for sea ice are U.S. National Ice Center (polar regions) and JMA (the Sea of Okhotsk).

100m/200m Temperatures in the Pacific Ocean



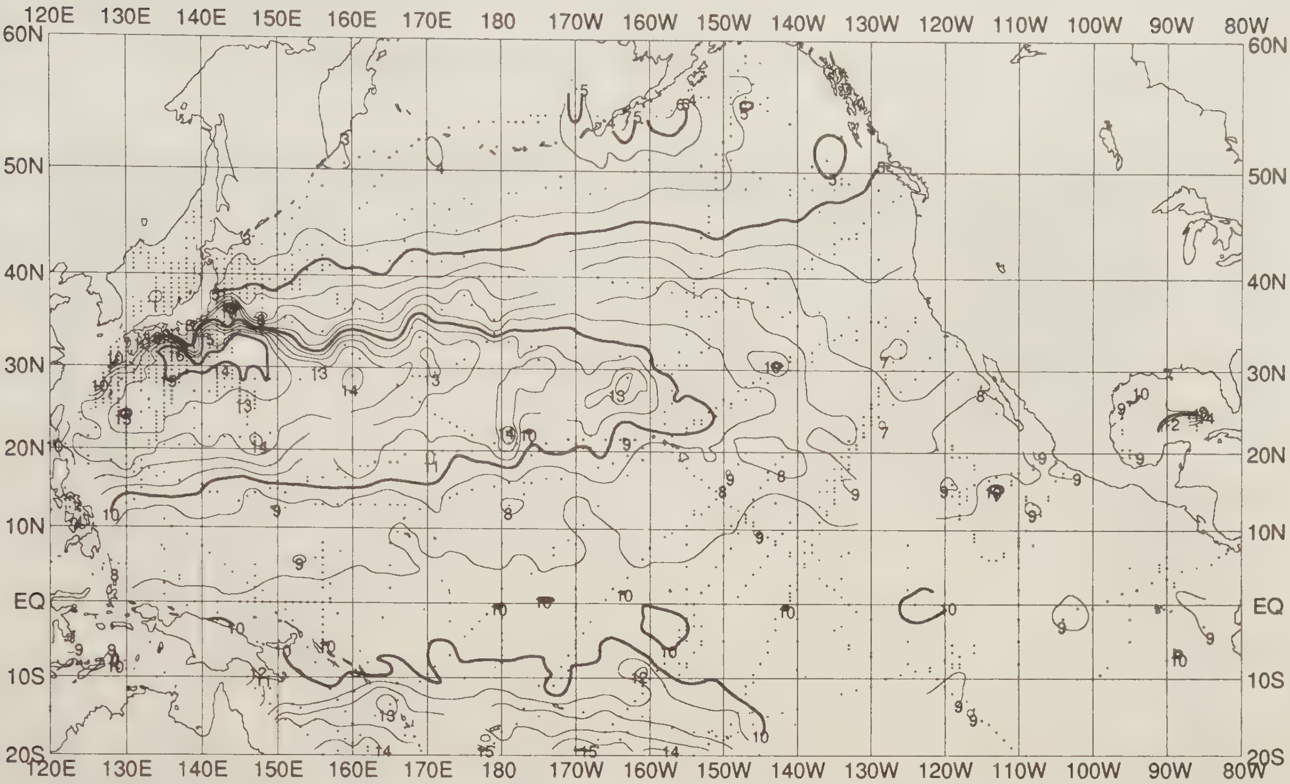
第 17 図　太平洋表層水温図（深さ 100 m）（1999 年 11 月）

Fig. 17　Subsurface (100 m) temperatures in the Pacific Ocean for November 1999. Contour interval is 1 ℃. Observation points are denoted by dots.



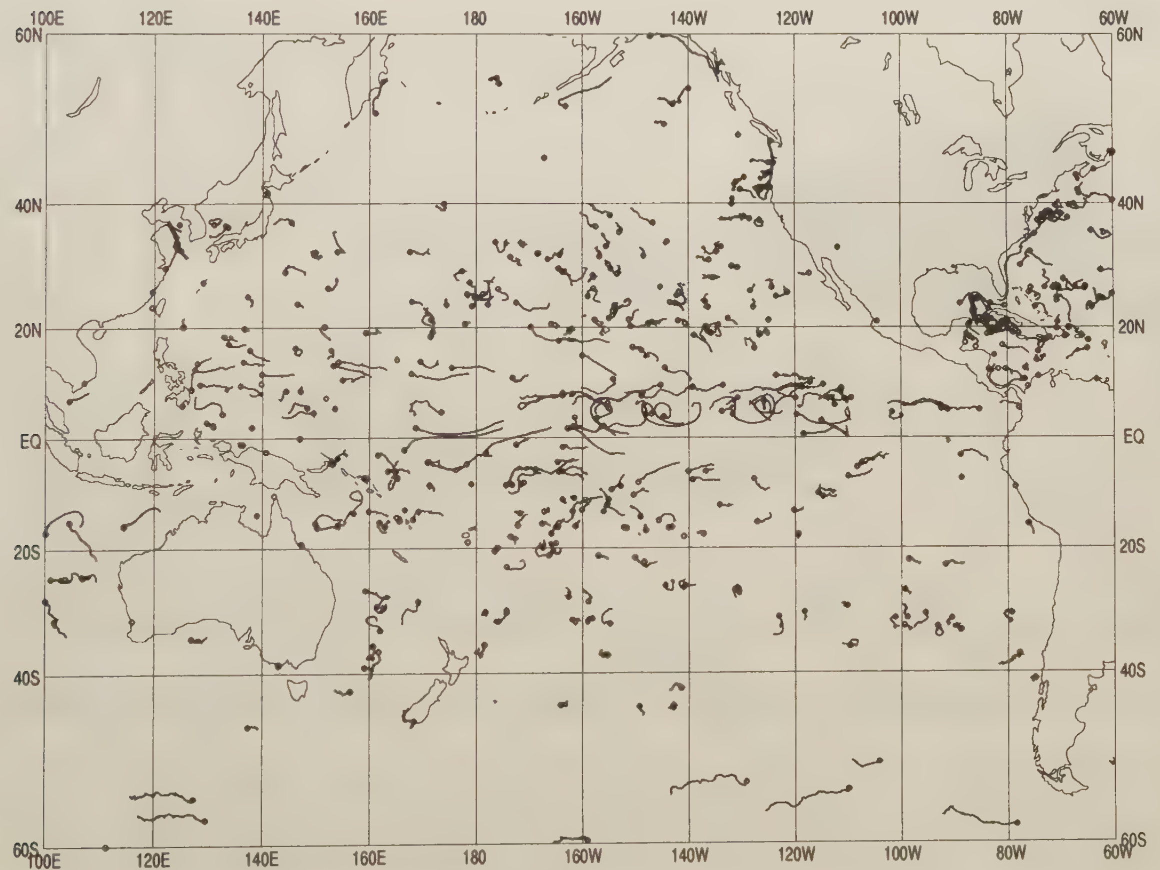
第 18 図　太平洋表層水温図（深さ 200 m）（1999 年 11 月）

Fig. 18　Subsurface (200 m) temperatures in the Pacific Ocean for November 1999. Contour interval is 1 ℃. Observation points are denoted by dots.



第 19 図　太平洋表層水温図（深さ 400 m）（1999 年 11 月）

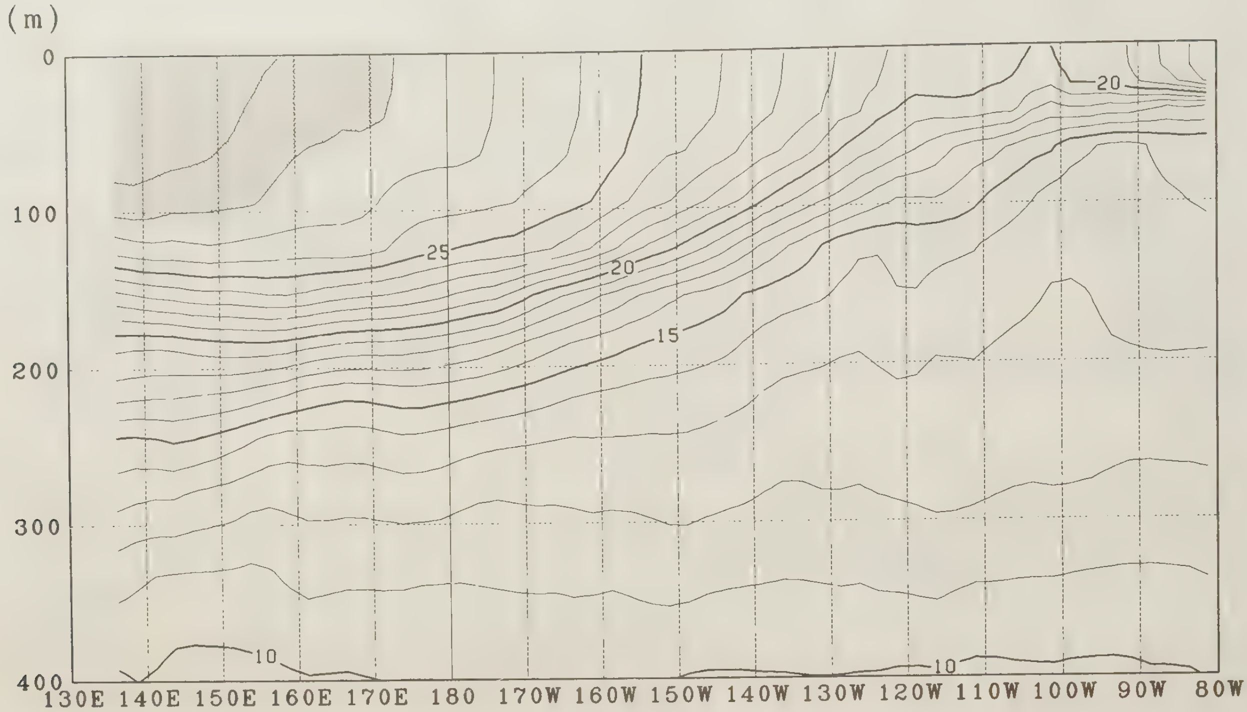
Fig. 19　Subsurface (400 m) temperatures in the Pacific Ocean for November 1999. Contour interval is 1 ℃. Observation points are denoted by dots.

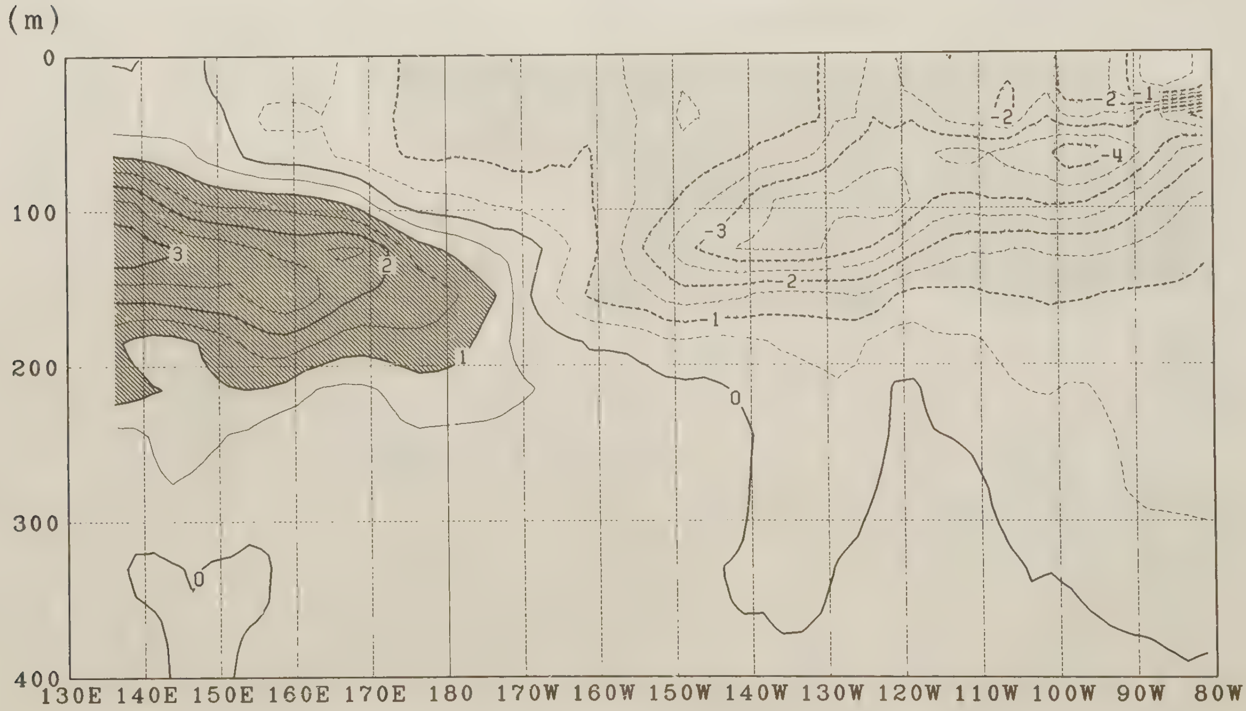


第 20 図　太平洋ブイ流跡図（1999 年 11 月）

Fig. 20　Movements of drifting buoys in the Pacific Ocean during November 1999. Each track is for one buoy. Small circles represent the last positions for the month.

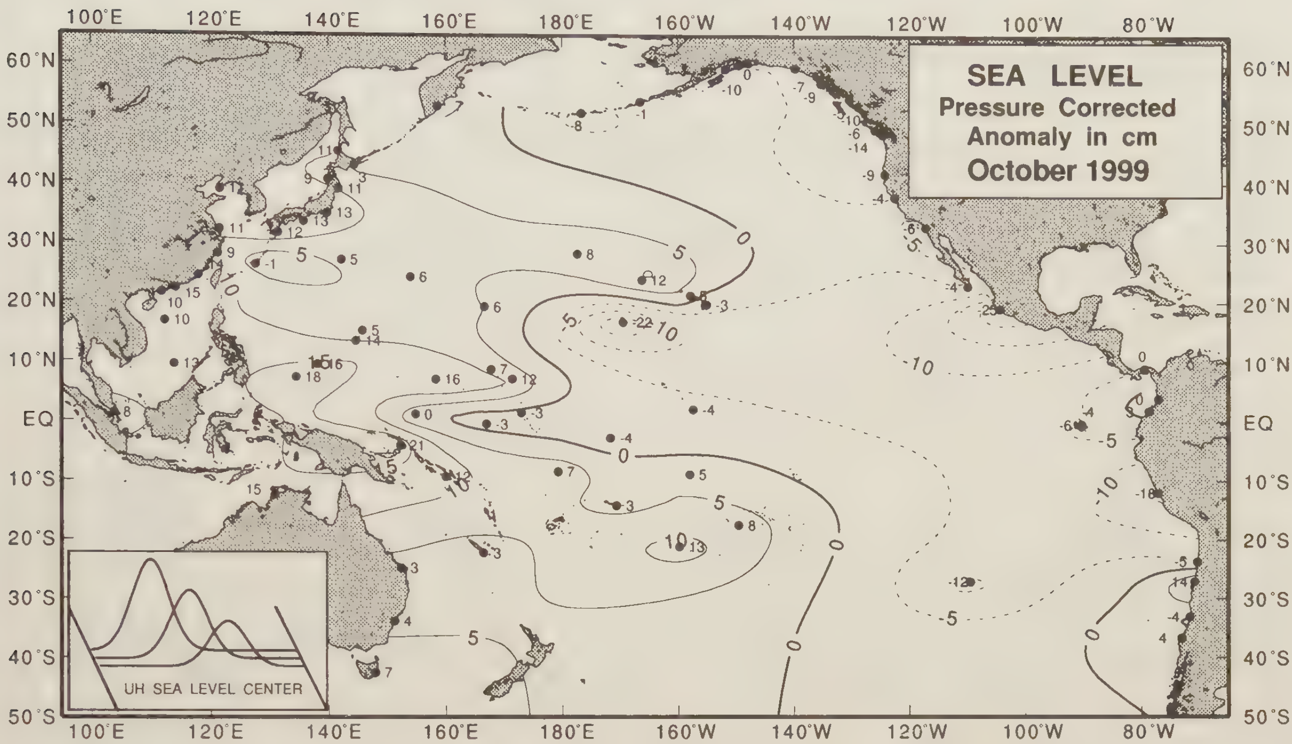
Depth-Longitude Sections of Equatorial Temperature & Anomalies





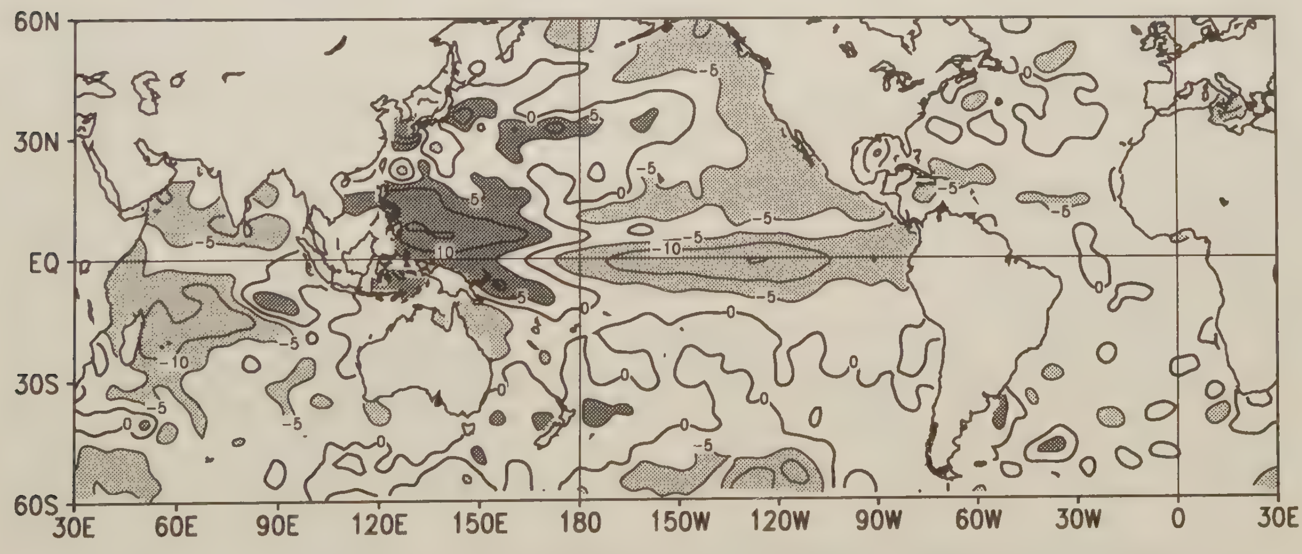
第21図　太平洋赤道に沿う表層水温（上）及び偏差（下）の深度－経度断面図（1999年11月）

Fig.21 Depth-longitude sections of temperature (top) and anomalies (bottom) along the equator in the Pacific Ocean for NOV 1999. Data are derived from the Ocean Data Assimilation System of JMA. Contour interval is 1°C (top) and 0.5°C (bottom). Values greater than 28°C in the top panel are shaded. In the bottom panel, values greater than 1°C are shaded and values less than -1°C are spotted. Anomalies are computed from 1987-1998 base period means.



第 22 図　太平洋月平均海面水位偏差図（1999 年 10 月）

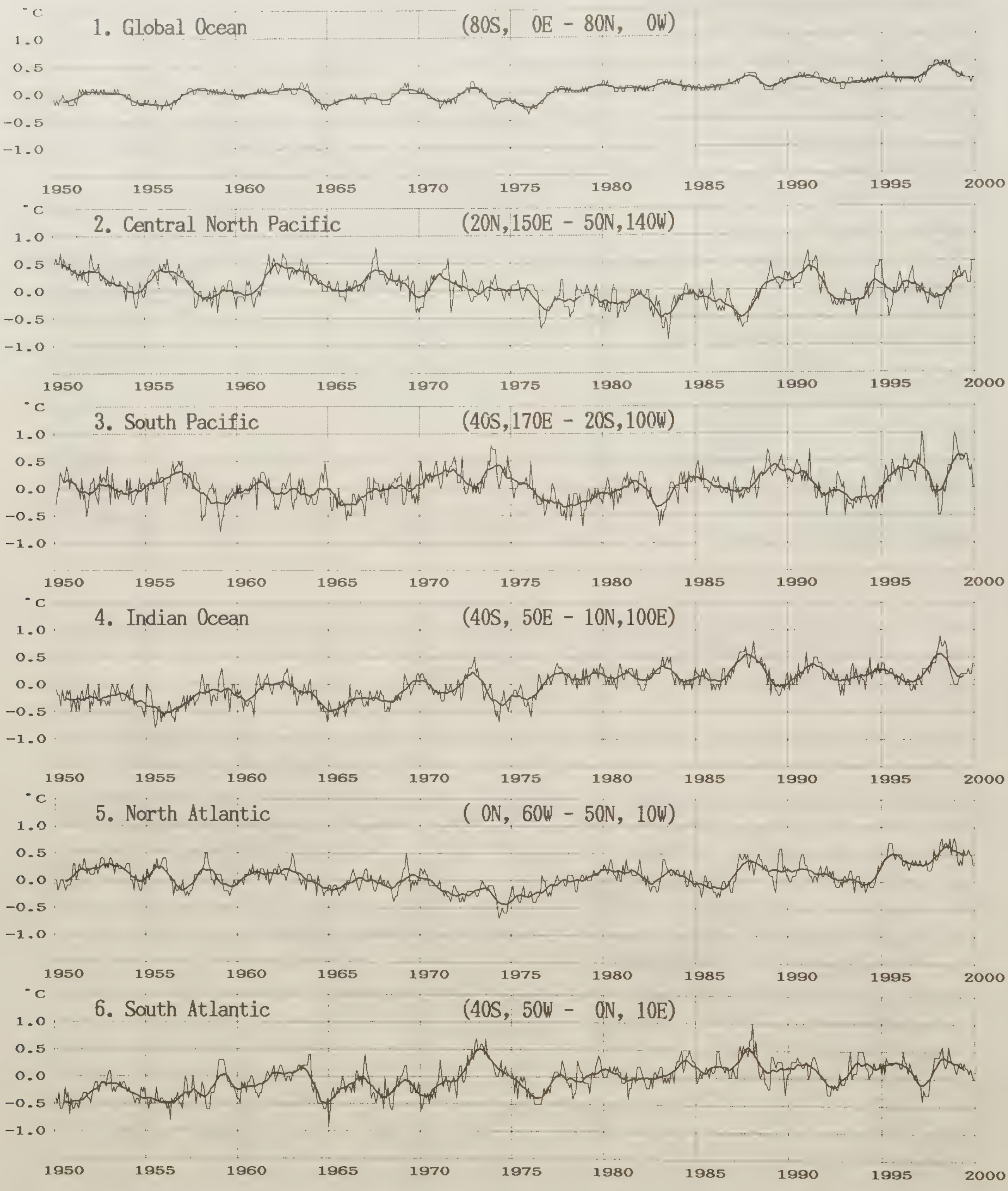
Fig. 22　Monthly sea level anomalies for October 1999 obtained from mean sea level (1975-1995) adjusted for atmospheric pressure. This figure is prepared by the SOC of ISLP-PAC, Department of Oceanography, University of Hawaii.



第 23 図　全球月平均海面高度偏差図（1999 年 10 月）

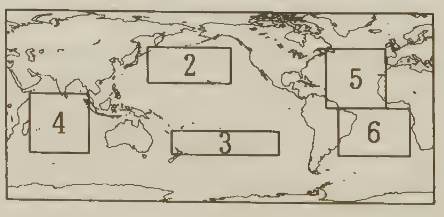
Fig. 23　Monthly sea surface height anomalies in the global ocean derived from the altimeter data of TOPEX/POSEIDON for October 1999. Contour interval is 5 cm. Positive anomalies exceeding +5 cm are shaded and negative anomalies exceeding -5 cm are spotted. Anomalies are computed from 1993-1998 base period means.

Long-term Variation of Monthly Mean SST Anomalies

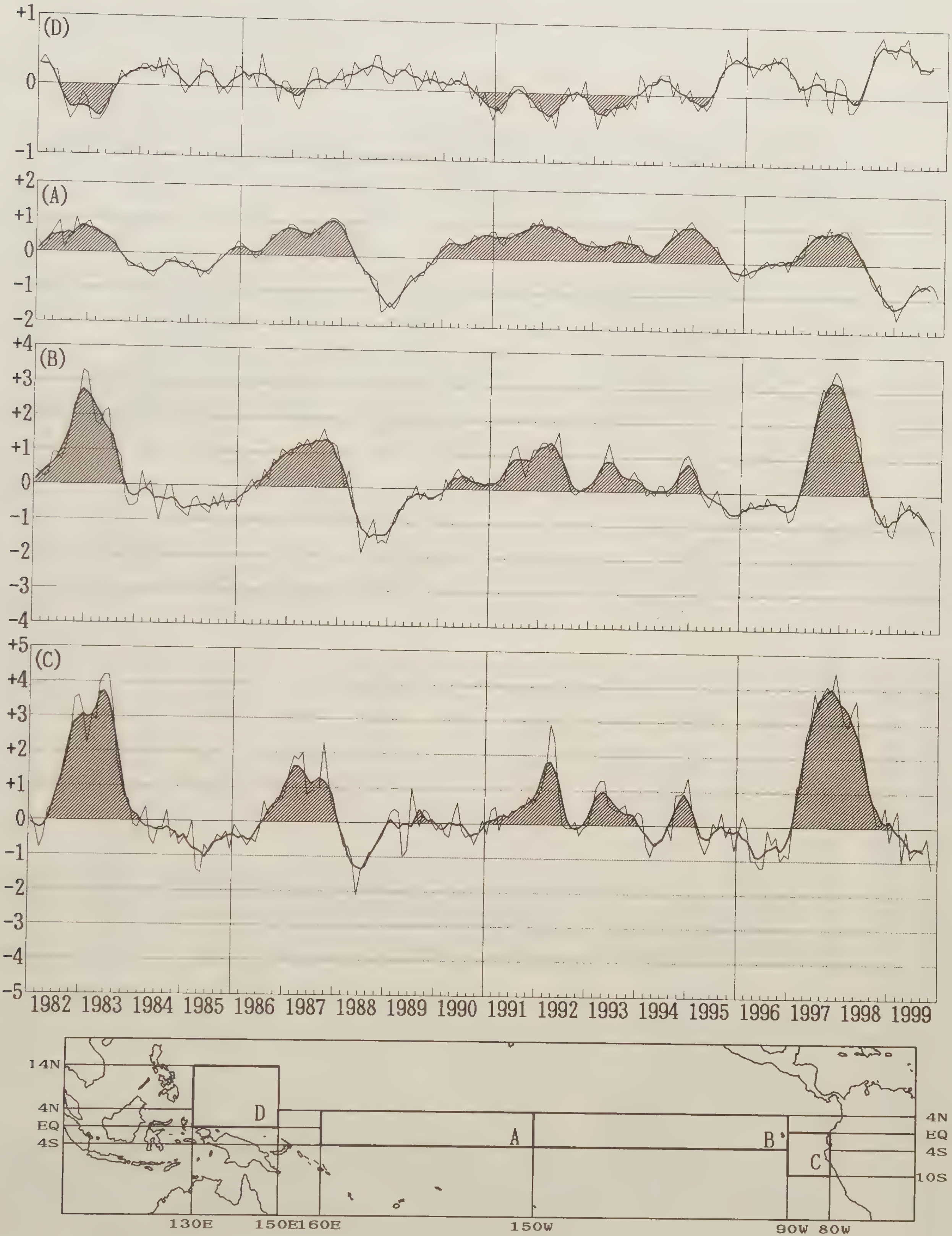


第24図 海域平均海面水温偏差の長期変動

Fig.24 Long-term variations of monthly mean sea surface temperature anomalies (°C) for the areas shown in the right panel. Anomalies are computed from the JMA climatology (1961-90). Thin lines show the monthly mean and thick lines their 13-month running means.



Time Series of Equatorial Pacific SST Anomalies



第25図　太平洋赤道域の海面水温偏差時系列図

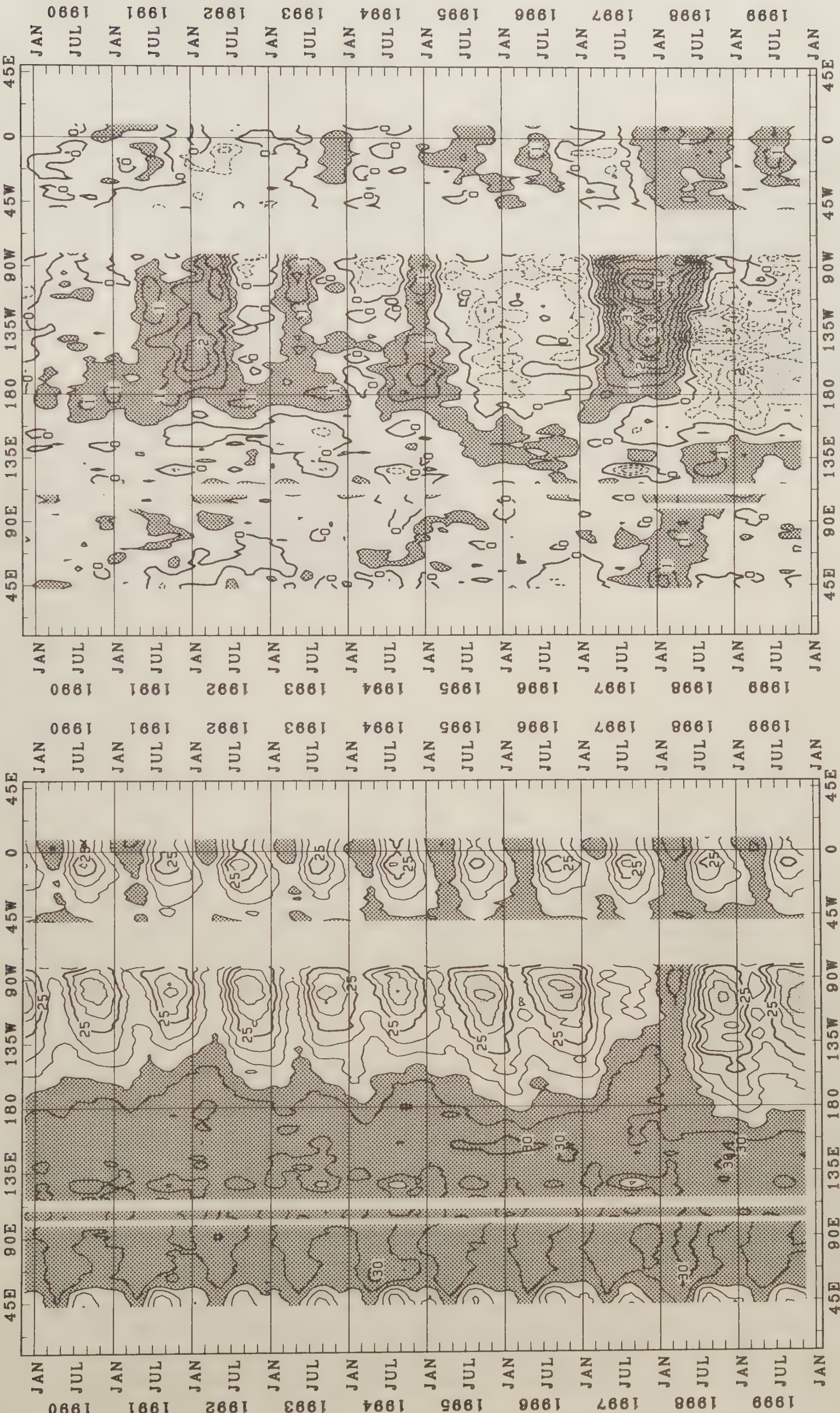
Fig.25 Time series of monthly mean SST anomalies (°C) in the equatorial Pacific Ocean for the areas indicated at the bottom panel. Thin lines show the monthly means and thick lines their 5-month running means. Positive anomalies (A, B, C) and negative anomalies (D) are shaded. Anomalies are computed from the JMA climatology (1961-1990).

El Nino Monitoring Indices

MONTH	SEA SURFACE TEMPERATURE AND ANOMALY (°C) REGION D 14N-EQ 130E-150E		REGION A 4N-4S 160E-150W		REGION B 4N-4S 150W-90W		REGION C EQ-10S 90W-80W		SOI	SEA LEVEL PRESSURE ANOMALY (hPa) TAHITI 17-33S 149-37W	DARWIN 12-24S 130-52E
JAN 97	28.6	0.1	28.3	0.3	24.7	-0.7	23.4	-0.9	0.3	1.7	0.9
FEB 97	28.5	0.2	28.2	0.2	25.9	-0.3	25.9	0.2	1.2	1.0	-1.9
MAR 97	28.3	-0.1	28.4	0.3	27.0	0.1	27.1	1.2	-0.6	-0.5	0.9
APR 97	29.0	0.2	29.1	0.9	27.5	0.4	26.3	1.2	-1.1	0.4	2.3
MAY 97	29.5	0.4	29.4	0.9	27.9	1.3	26.5	2.6	-2.5	-2.1	0.9
JUN 97	29.6	0.3	29.3	0.8	28.1	2.0	25.7	3.0	-2.3	-0.8	2.1
JUL 97	29.5	0.3	29.4	0.9	27.8	2.6	25.5	3.9	-0.8	-0.1	1.2
AUG 97	29.0	-0.1	29.2	0.8	27.7	3.1	24.0	3.4	-2.0	-0.9	2.2
SEP 97	29.0	-0.2	29.4	1.1	27.5	2.9	24.2	3.9	-1.4	0.1	2.7
OCT 97	29.6	0.3	29.1	0.7	27.9	3.3	24.8	4.1	-1.6	-0.2	2.7
NOV 97	29.5	0.3	29.3	0.9	28.2	3.6	25.4	3.9	-1.2	0.4	2.7
DEC 97	29.1	0.2	29.2	1.0	28.3	3.4	27.1	4.5	-0.9	-0.5	1.1
JAN 98	28.3	-0.2	29.0	1.0	28.4	3.0	28.0	3.7	-2.3	-3.6	1.4
FEB 98	28.1	-0.2	28.8	0.8	28.8	2.6	28.8	3.1	-1.8	-0.9	3.5
MAR 98	28.3	-0.1	28.6	0.5	29.0	2.1	28.8	2.9	-2.5	-2.8	2.3
APR 98	28.8	0.0	28.5	0.3	28.9	1.8	28.5	3.4	-2.3	-1.5	1.4
MAY 98	29.3	0.2	28.7	0.2	28.3	1.7	27.6	3.7	0.0	0.4	0.5
JUN 98	29.7	0.4	28.4	-0.1	26.1	0.0	24.7	2.0	1.1	0.9	-0.5
JUL 98	29.9	0.7	28.0	-0.5	25.3	0.1	23.2	1.6	1.5	1.8	-0.6
AUG 98	29.9	0.8	27.7	-0.7	24.5	-0.1	21.7	1.1	1.0	1.4	-0.2
SEP 98	30.1	0.9	27.8	-0.5	23.9	-0.7	21.0	0.7	1.0	1.4	-0.4
OCT 98	30.0	0.7	27.3	-1.1	23.8	-0.8	20.8	0.1	1.2	0.8	-1.1
NOV 98	29.9	0.7	27.2	-1.2	24.1	-0.5	21.6	0.1	1.0	0.4	-1.5
DEC 98	29.5	0.6	27.1	-1.1	23.8	-1.1	23.2	0.6	1.5	1.1	-1.5
JAN 99	29.3	0.8	26.4	-1.6	24.2	-1.2	23.9	-0.4	1.5	1.8	-1.5
FEB 99	29.1	0.8	26.7	-1.3	25.5	-0.7	25.9	0.2	0.8	1.3	-0.6
MAR 99	29.3	0.9	27.0	-1.1	26.8	-0.1	26.4	0.5	0.8	0.4	-1.3
APR 99	29.3	0.5	27.3	-0.9	26.7	-0.4	24.1	-1.0	1.8	1.3	-0.9
MAY 99	29.7	0.6	27.8	-0.7	26.4	-0.2	23.8	-0.1	0.3	1.1	1.1
JUN 99	29.7	0.4	28.0	-0.5	25.5	-0.6	21.8	-0.9	0.1	0.6	0.4
JUL 99	29.6	0.4	27.8	-0.7	24.8	-0.4	20.9	-0.7	0.5	1.0	0.1
AUG 99	29.5	0.4	27.8	-0.6	24.0	-0.6	20.0	-0.6	0.0	1.3	1.1
SEP 99	29.7	0.5	27.8	-0.5	23.8	-0.8	19.7	-0.6	-0.1	0.2	0.4
OCT 99	29.8	0.5	27.8	-0.6	23.6	-1.0	20.4	-0.3	1.1	1.2	-0.4
NOV 99	29.7	0.5	27.5	-0.9	23.2	-1.4	20.3	-1.2	1.1	1.2	-0.9

第1表　エルニーニョ監視指数

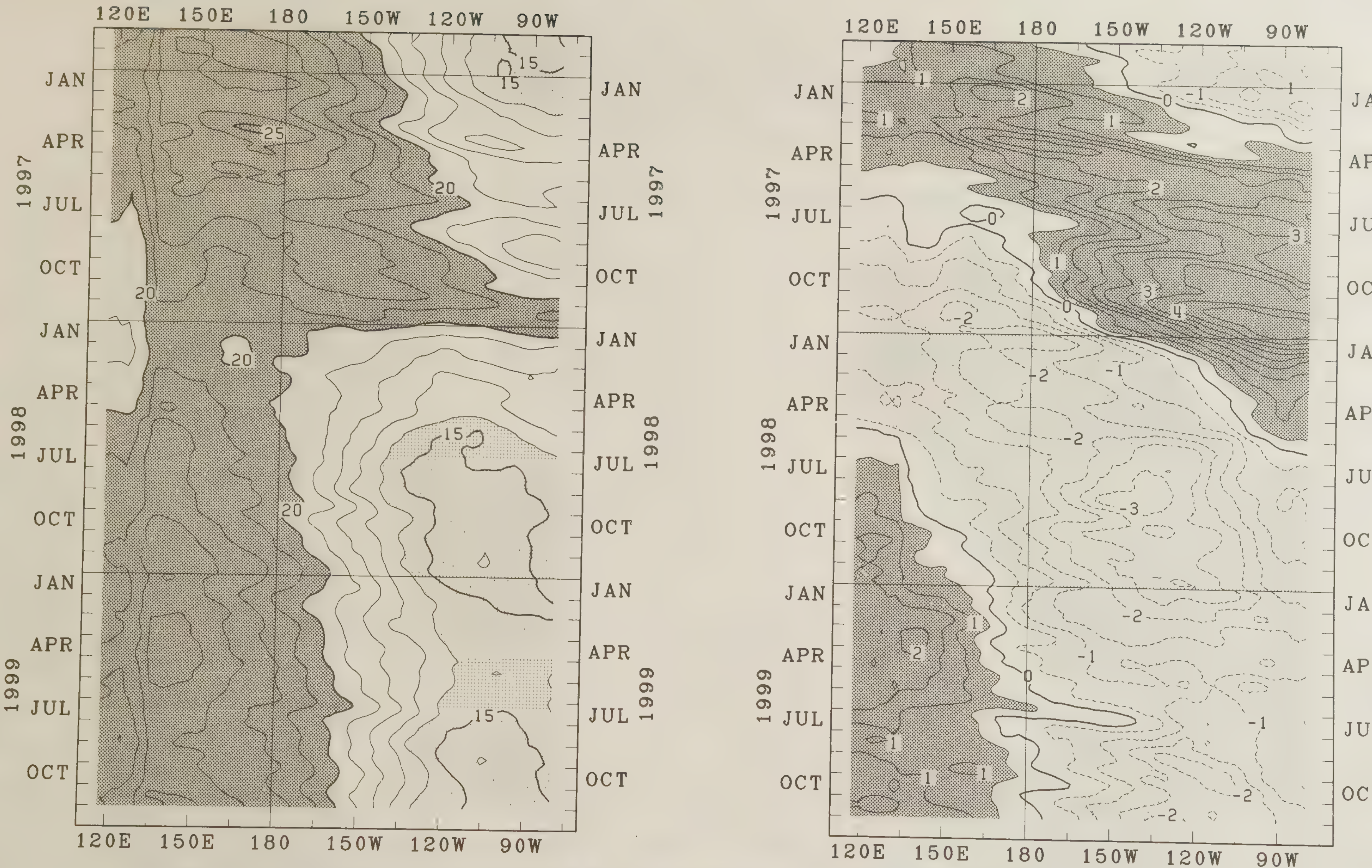
Table 1 El Nino Monitoring indices



第 26 図　赤道に沿った海面水温（左）及び偏差（右）の時間-経度断面図

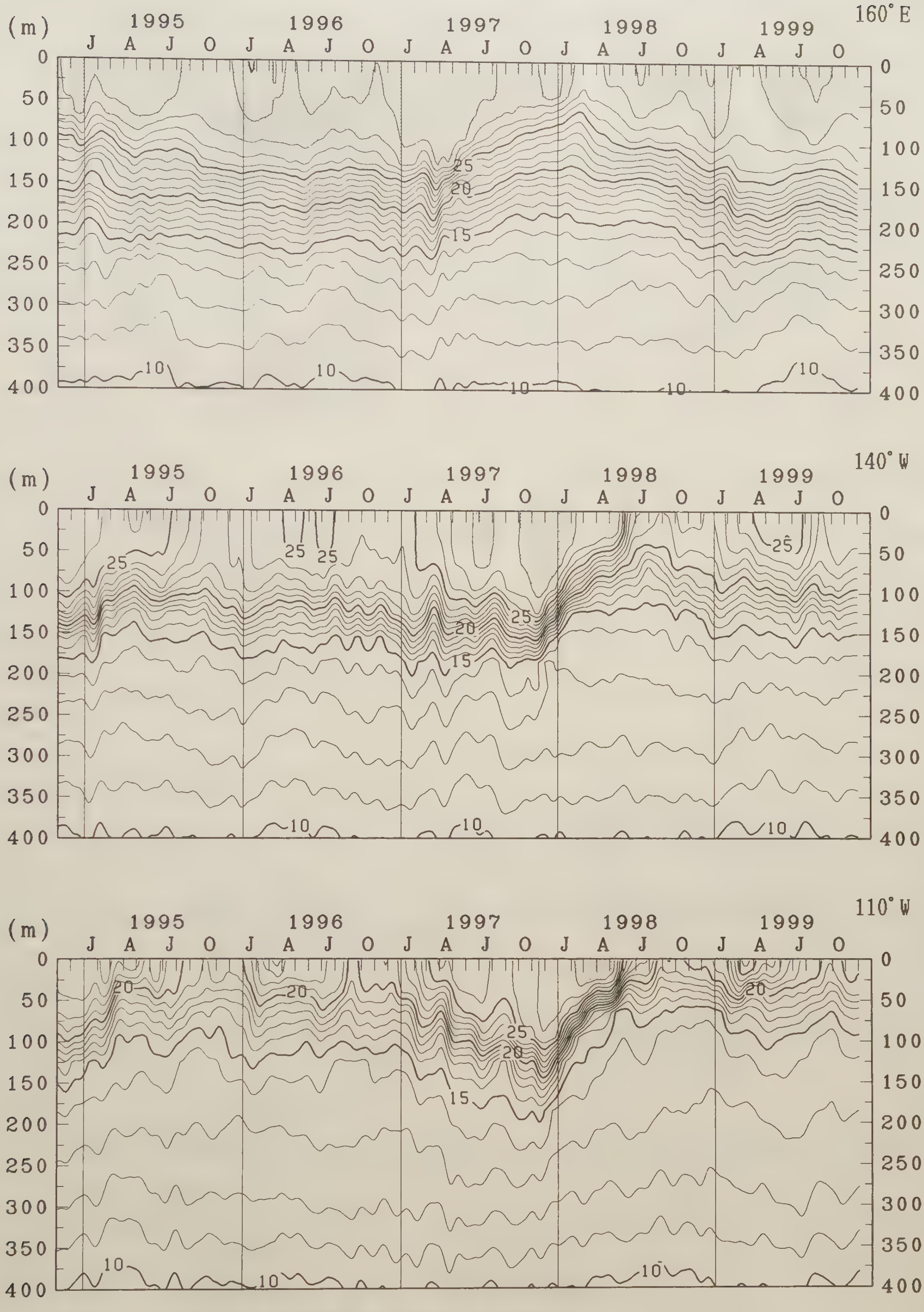
Fig. 26　Time-longitude sections of SSTs (left) and anomalies (right) along the equator (2˚N-2˚S) in the global ocean. Contour interval is 1˚C (left) and 0.5˚C (right). Values greater than 28˚C are shaded and values less than 23˚C are spotted in the left panel. Dashed contours indicate negative anomalies in the right panel. Anomalies are computed from 1961-1990 base period means.

Time–Longitude Sections of Ocean Heat Content & Anomalies (Eq.)



第27図　太平洋の赤道に沿う海洋表層の貯熱量（左）及び偏差（右）の時間－経度断面図

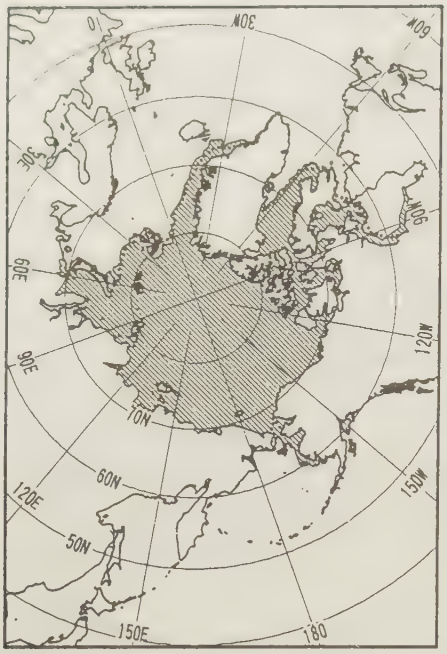
Fig.27 Time-longitude sections of ocean heat content in the upper 260 m along the equator (left) and anomalies (right) in the Pacific Ocean. Data are derived from the Ocean Data Assimilation System of JMA. Contour interval is 1°C (left) and 0.5°C (right). Values greater than 20°C are shaded and values less than 16°C are spotted in the left panel. Dashed contours indicate negative anomalies in the right panel. Anomalies are computed from 1987-1998 base period means.



第28図　太平洋赤道域の表層水温の時間－深度断面図

（上：西部、中：中部、下：東部）

Fig.28 Time-depth sections of equatorial subsurface temperature for the western Pacific (top, 160°E), the central Pacific (middle, 140°W) and the eastern Pacific (bottom, 110°W). Data are derived from the Ocean Data Assimilation System of JMA. Contour interval is 1°C. Values greater than 28°C are shaded.

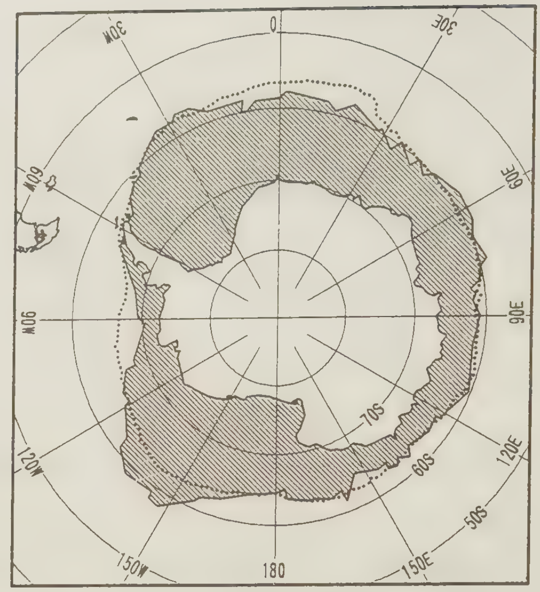


第29-1図　北極域の海氷図（1999年11月18日）

Fig.29-1 Sea ice chart in the Arctic on 18 Nov. 1999.

The shaded area represents the sea ice extent. The dotted line denotes the mean ice edge averaged for the period from 1972 through 1990.

The data source is the National Ice Center (USA).

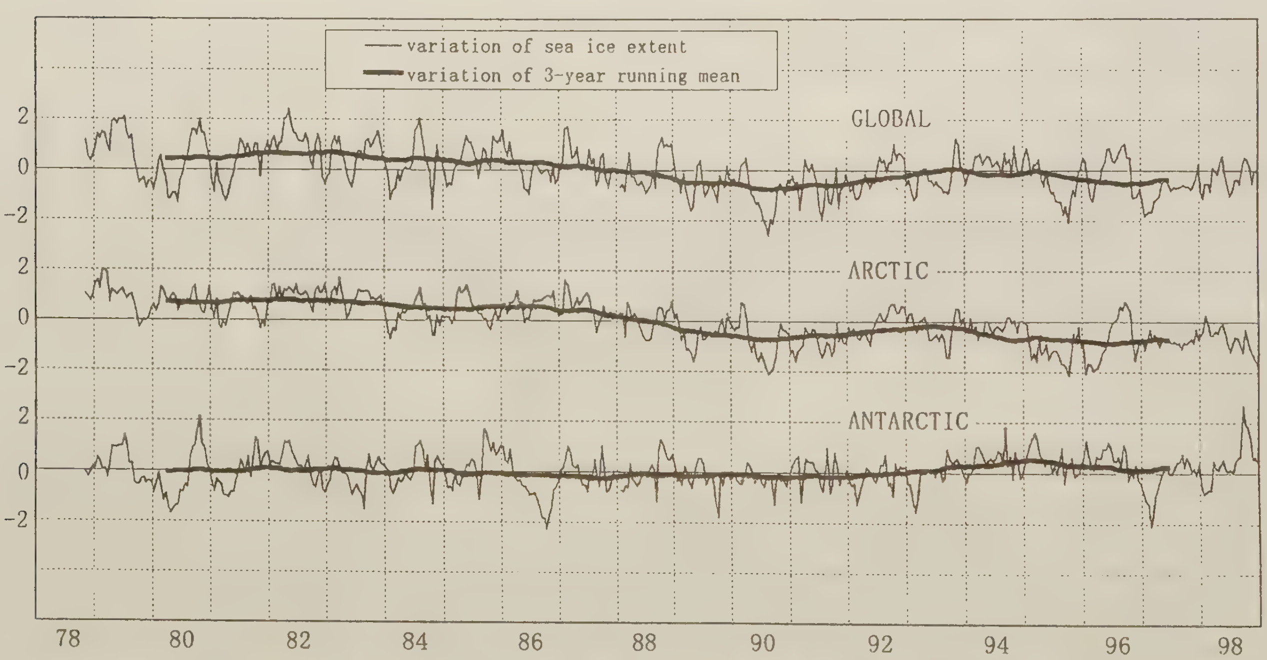


第29-2図　南極域の海氷図（1999年11月18日）

Fig.29-2 Sea ice chart in the Antarctic on 18 Nov. 1999.

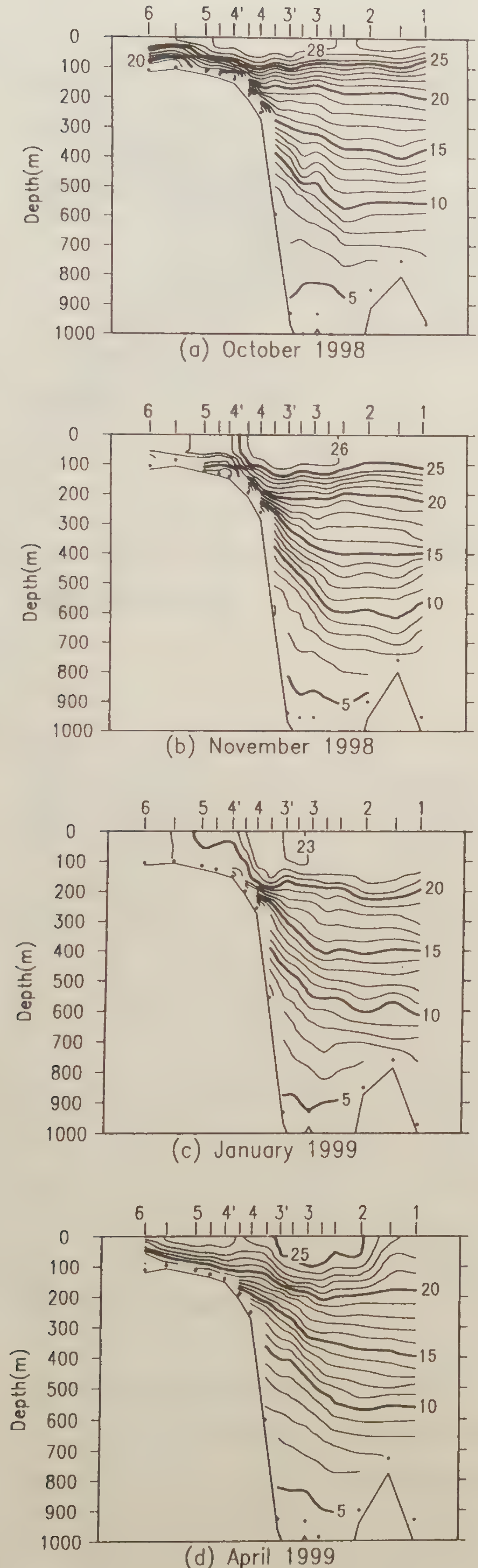
The shaded area represents the sea ice extent. The dotted line denotes the mean ice edge averaged for the period from 1973 through 1990.

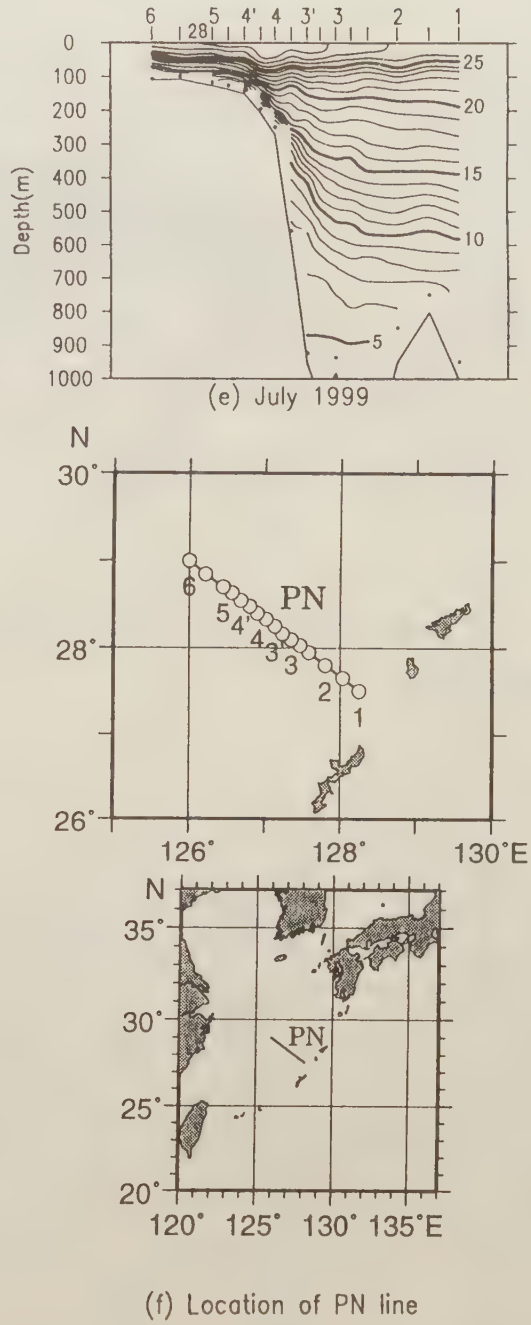
The data source is the National Ice Center (USA).



第29-3図 全球、北極及び南極における海氷域面積の偏差（平年差／標準偏差）の時系列図
資料は米国雪氷データセンター提供のSSM/Iデータによる
（縦軸の目盛りは標準偏差（全球71万km^2、北極56万km^2、南極67万km^2）を表す）

Fig.29-3 Time series of the deviation (deviation from normal)/(standard deviation) of Global, Arctic and Antarctic sea ice extent (Based on SSM/I data by National Snow and Ice Data Center,USA)
(Scale of the vertical axis indicates standard deviation (Global: 71×10^4km^2, Arctic: 56×10^4km^2, Antarctic: 67×10^4km^2).)

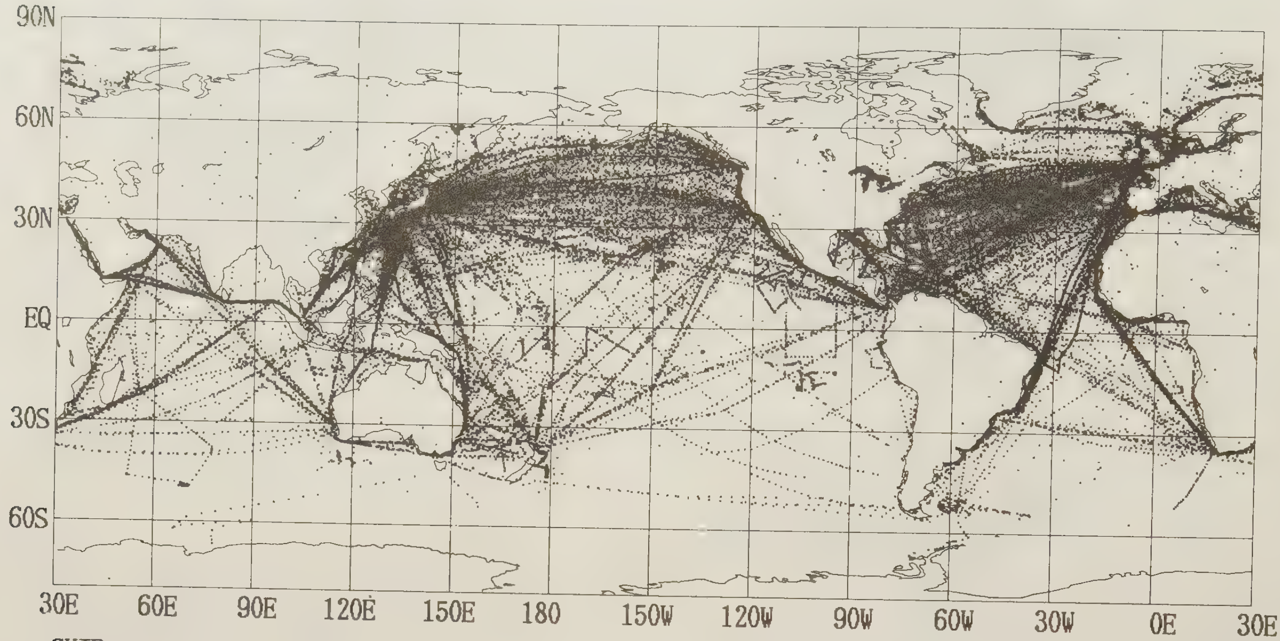




第30図　長崎海洋気象台長風丸によるPN線に沿った水温鉛直断面図．(a)1998年10月、(b)1998年11月、(c)1999年1月、(d)1999年4月、(e)1999年7月、(f)PN線の位置図．

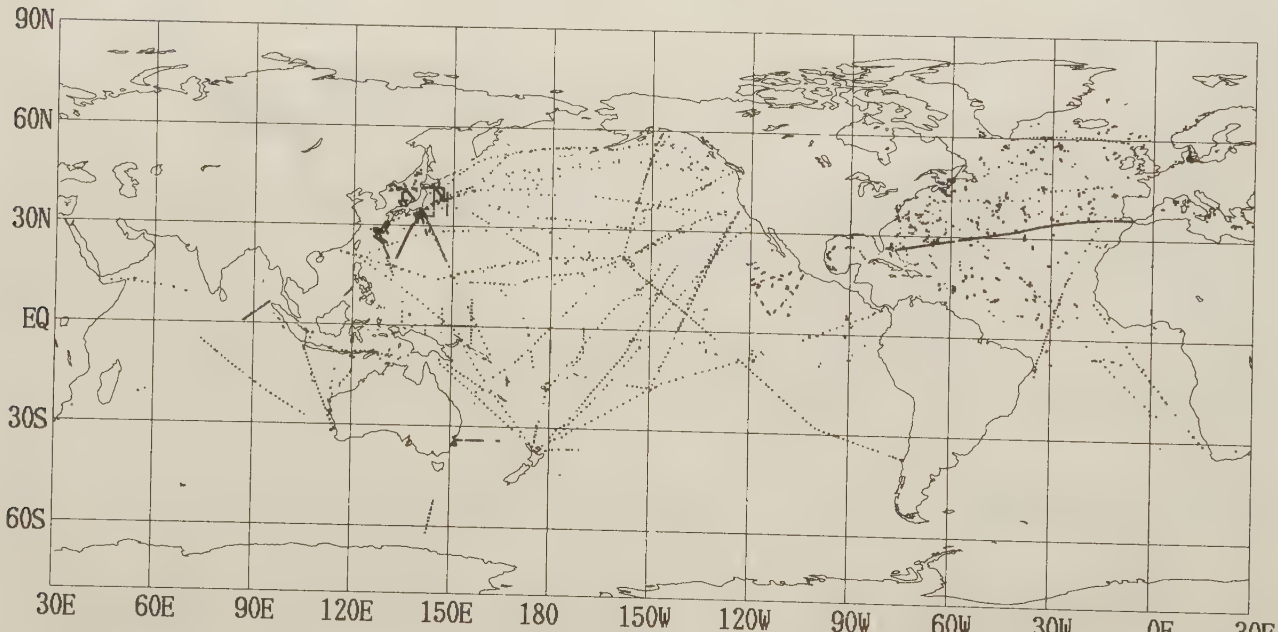
Fig.30 Vertical sections of water temperature (℃) along PN line by R/V Chofu Maru of Nagasaki Marine Observatory, JMA. (a) October 1998, (b) November 1998, (c) January 1999, (d) April 1999, (e) July 1999, (f) Location of PN line.

Geographical Distribution of Oceanographic Data



SHIP messages

Total data:125687



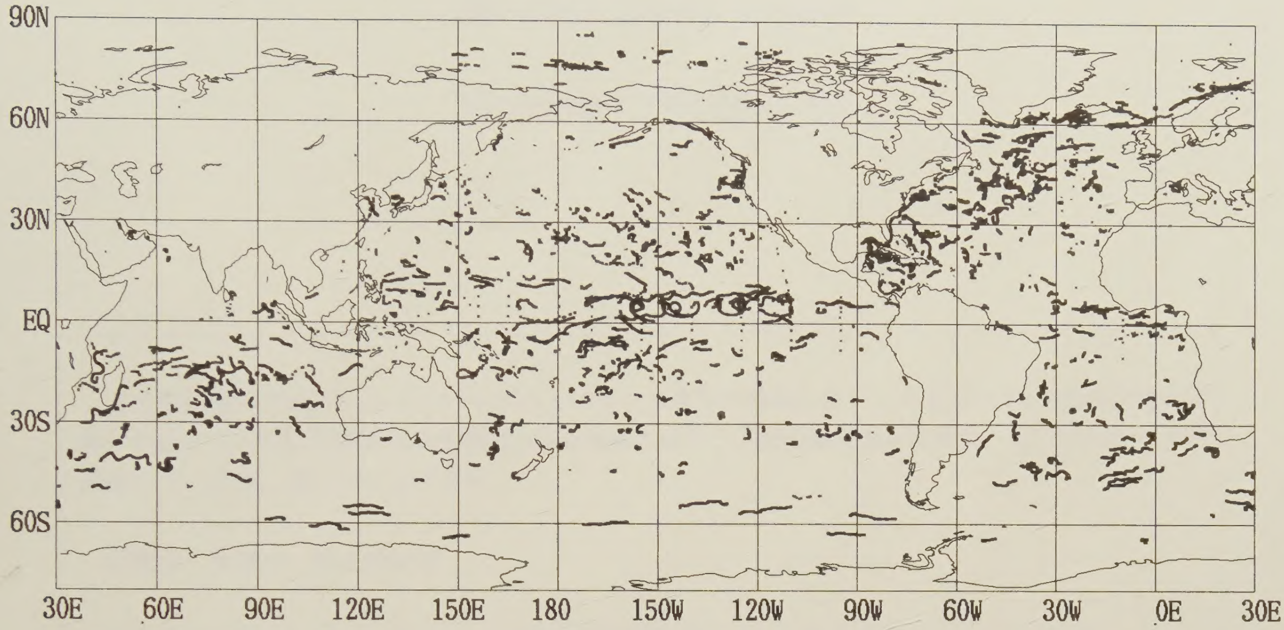
BATHY/TESAC messages

Total data: 4089

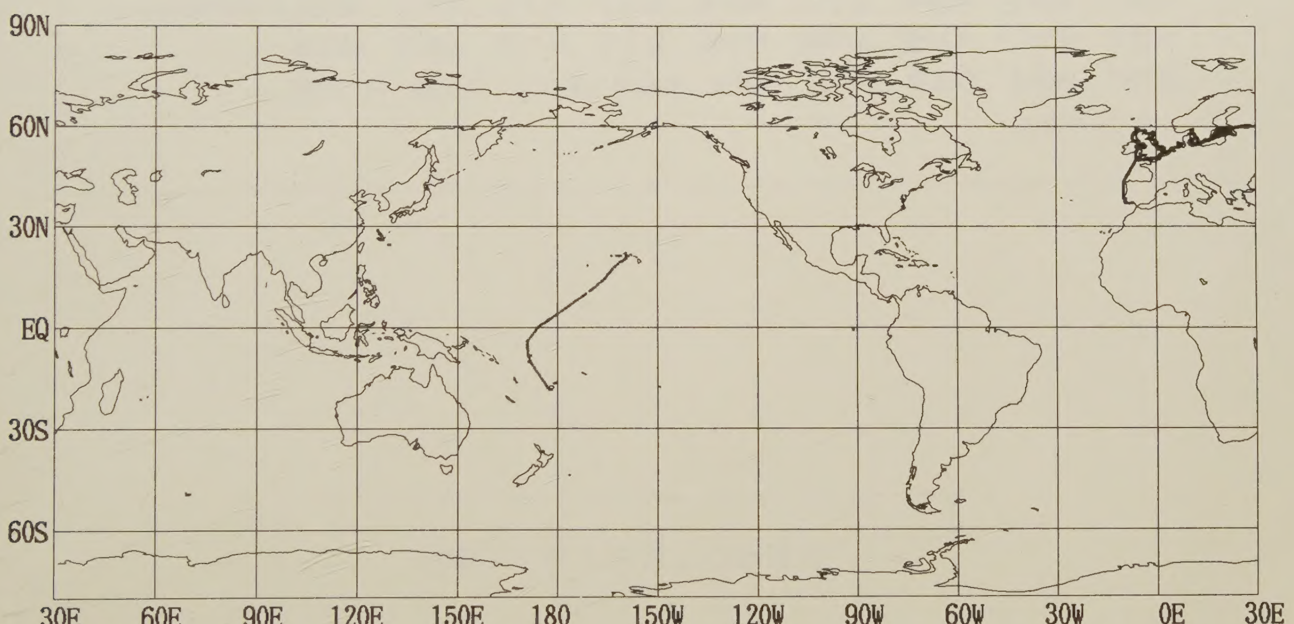
第31-1図　測点分布図(1999年11月)

Fig.31-1　Geographical distribution of SHIP messages (SST data, top) and BATHY/TESAC messages (subsurface temperature data, bottom) for NOV 1999.

Geographical Distribution of Oceanographic Data



BUOY messages Total data:263191



TRACKOB messages Total data: 1227

第31-2図 測点分布図(1999年11月)

Fig.31-2 Geographical distribution of BUOY messages (buoy drift and SST data, top) and TRACKOB messages (ship drift and SST data, bottom) for NOV 1999.

気 象 庁 海 洋 月 報

Monthly Ocean Report

November 1999 (No. 83)

本月報掲載の 1999 年 11 月のプロダクトには、気象庁が観測したデータ及び GTS（全球気象通信網）を通じて入手した国際気象通報式による通報のほか、下記の機関等から提供いただいたデータを使用しています。御礼申し上げます。

防衛庁、水産庁、海上保安庁

海洋科学技術センター、（財）日本海洋科学振興財団、（社）漁業情報サービスセンター

東北大学、東京水産大学、鹿児島大学

水産試験場等（北海道、青森県、岩手県、宮城県、秋田県、山形県、福島県、茨城県、千葉県、東京都、新潟県、富山県、石川県、福井県、静岡県、愛知県、三重県、京都府、和歌山県、島根県、山口県、徳島県、高知県、福岡県、長崎県、宮崎県、沖縄県）

（順不同）

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